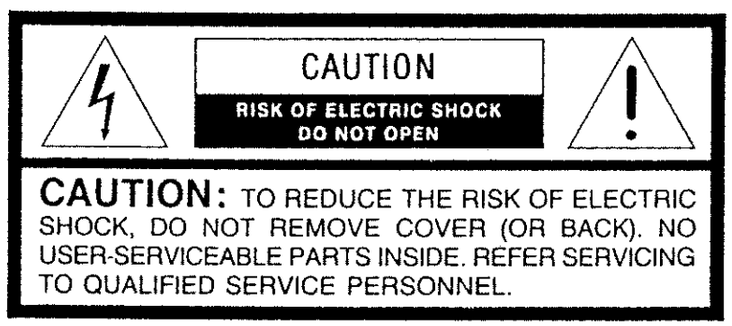
CASIO VZ-1
DIGITAL SYNTHESIZER

Thank you for purchasing the Casio VZ-1 Digital Synthesizer. The VZ-1 is a highly innovative digital synthesizer which features Casio's newly-developed "iPD" (Interactive Phase Distortion) Modular Sound Source system. To obtain optimum performance and assure long-term reliability from your new VZ-1, be sure to read this manual carefully and store it in a safe place so you can refer to it often.


CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

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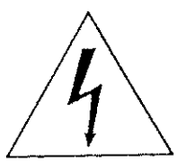


The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

Main Features

1 Amazing Synthesis Versatility Thanks to Casio's All-new iPD Sound Source

Casio's all-new "Interactive Phase Distortion" (iPD) sound source system actually consists of 8 independent "modules" (M1 to M8). Each of these modules contains a DCO and a DCA, and is capable of generating independent waveforms. In the iPD system, the wave generated by any module can be used in either of two ways; to produce audible sounds or to modify waves generated by other modules.

The 8 iPD sound source modules work in associated pairs that are called "Internal Lines," or simply "lines." There are 4 internal lines - A, B, C and D.

The waveforms generated by both modules in any line can be used together in three different ways. They can be mixed, or one of the waveforms can be used to modulate the other for RING modulation or as the PHASE of a succeeding line.

2 Instant Recall of up to 256 Sounds and 256 Operation Memories

64 presets give you a wide range of vocal versatility. And with the use of a standard ROM card, the VZ-1 gives you incredible tonal expansion potential - up to 128 patches and 128 keyboard setups are literally at your fingertips. What's more, you can store up to 64 sounds and 64 operation memories on an optional RAM card, for even greater freedom of timbral expression.

3 "Player-friendly" Menus and Functions

Virtually all of the VZ-1's editing and programming operations are organized into three basic sub-modes - Menu 1, Menu 2 and Menu 3 that feature a variety of "functions." Each of these functions is further broken down into "parameters," which are constants that have changeable values or settings. To alter VZ-1 sounds or programming, you simply alter the value of these parameters using a value slider or value keys.

4 Wide Backlit LCD Graphic Display

The VZ-1's wide graphic LCD features a hierarchical, "player friendly" menu structure, which allows speedy and accurate operations. Sound source configuration, patch editing, keyboard setup creation, output channel and MIDI specifications - in fact, virtually all VZ-1 operations are controlled by interacting with various functions that are found in the three VZ-1 menus. And a number of VZ-1 functions feature "graphic editing" capabilities.

5 Combination Mode Provides Layered and Split Voicing

The VZ-1's "Combination" mode lets you mix together up to 4 different patches in any of 8 different patch mix or patch split configurations. You can set effect and amp levels independently for each patch, and output them together through the MIX OUT channel. Or output the 4 patches through the VZ-1's L/R LINE OUT channels.

6 Multiple Control Wheels

In addition to a versatile, accurate pitch bend wheel, the VZ-1 features 2 user-assignable "Definable Wheels" for control of a wide range of modulation effects, including tremolo and vibrato. Definable Wheel 2 is "spring loaded," so that it returns to the OFF position automatically when it is released.

7 Inital Touch and After Touch for Greater Musical Expression

The VZ-1's responsive keyboard features both initial touch and after touch, for expanded expressive and dynamic control. With initial touch, you can control changes in pitch, timbre and volume according to key attack speed, while after touch gives you "playing-hand" control of amplitude and modulation contours. The VZ-1 - precise control of keyboard effects, with both hands still on the keyboard!

8 Velocity Split & Positional Cross Fade

The VZ-1 puts powerful multi-voice performance in your hands, with advanced features such as velocity split and positional cross fade. Set up multi-layered voices with up to 3 split points, and "fade" the voices into one another so there's no audible "split point" with the cross fade function, or control multiple voices through keyboard velocity using velocity split.

9 Key Follow Function

Casio's innovative key follow function lets you vary both DCO and DCA contours in accordance with the pitch of the key played on the keyboard. This function gives timbres a much more "natural" and realistic sound.

10 Multi-Channel MIDI Performance

The VZ-1 features Casio's exclusive multi-channel mode which can accept up to 8 timbres from separate MIDI sound sources. These can then be divided into constituent polyphonics and ensembled in any format you desire. Multi-timbral MIDI expansion, monophonic MIDI performance, or total 16-note MIDI polyphony can be selected.

11 Optional Foot Pedal (VP-10)

Choose an optional VP-10 for foot-pedal control of definable wheel functions.

12 Optional RAM Card (RA-500)

Choose an optional RA-500 RAM card for expanded sound storage and recall capabilities. Each RAM card holds up to 64 VZ-1 patches and 64 VZ-1 operation memories.

About this Manual

While you may not realize it quite yet, the VZ-1 is an incredibly complex digital synthesizer that has a lot more in common with a personal computer than it does an "electronic" keyboard instrument. This manual is intended only as a reference to provide instructions on the most basic VZ-1 operations.

When you take the VZ-1 out of its box for the first time, you'll probably want to plug it in immediately to see how it sounds. Read through "Plug in and Play!" for basic instructions on how to connect the VZ-1 and select its preset sounds.

Once you're ready to begin studying the true power of the VZ-1, you'll need to have a basic knowledge of its iPD modular sound source system. Read the section beginning on page 12 thoroughly - if you're not familiar with basic sound synthesis terms and theory, be sure to study the VZ-1 Sound Seminar on page 92 as well.

Next, you should familiarize yourself with the VZ-1's operating system controls - the keys, selectors and sliders found on the VZ-1 front panel. Read through the section found on page 16 for an introduction to these controls.

When you're ready to start using the VZ-1's advanced editing and sound data storage capabilities, you'll need to learn how to use the "FUNCTION INDEXES" beginning on page 20. **Be sure** to work through the practice exercise on pages 20 ~ 24, as well as the GRAPHIC EDITING examples. These will give you a fairly solid understanding of basic VZ-1 synthesis operations.

The FUNCTION INDEXES will be an invaluable aid in all VZ-1 editing operations. For this reason, be sure to keep this manual handy whenever editing sounds.

Most importantly, remember that this manual is meant as a reference only - you'll only be able to realize the true power of the VZ-1 as you apply it to your own musical performance.

VZ-1 Important Terms

Throughout this manual you will encounter terms (words) which you may - or may not - be familiar with. Before jumping into VZ-1 operations, it's important to make sure that you understand the basic usage of these terms in this manual. Take a few moments to read through these words and become familiar with them - you'll find it will enhance your overall understanding of the VZ-1.

MENU	A displayed list of the various FUNCTIONS you can select to perform on the VZ-1. The VZ-1 features three basic Menus.
FUNCTION	Any of the items listed on the VZ-1 menus. Each Function contains a variety of PARAMETERS, and is identified by a two-digit number. For example, Function 02 in Menu 1 contains parameters related to detuning.
PARAMETER	A constant control which features variable levels. These parameters control not only data that affects the various components of a sound, but also aspects of the overall keyboard setup.
VALUE	The level or setting assigned to an individual parameter.
MODULE	The VZ-1's iPD sound source features 8 independent "modules." These can be thought of as independent - *but interrelated* - oscillators with controls.
INTERNAL LINE	Sound source MODULES work together in "pairs." These pairs form what is known as an INTERNAL LINE, or simply "line." For example, Module 1 and Module 2 (M1 and M2) form Internal Line A - known in this manual as LINE A. M3 and M4 form LINE B, etc.
EXTERNAL PHASE	In addition to using the output of any LINE to create an audible sound, the VZ-1 lets you utilize the output of any LINE to modulate the succeeding line. For example, the output of LINE A can be used to modulate LINE B. This configuration is known as an "External Phase."
PATCH	With analog synthesizers, a "patch" literally referred to the way in which various synthesizer blocks or modules were hard-wired (hooked up). With digital synthesizers, this term has come to refer to completed sound data which can be output by the synthesizer. In this manual, you can think of "patch" as referring to **any completed sound data coming from modules 1 through 8.**
OPERATION MEMORY	An operation memory is literally a full keyboard setup, including specifications for multiple patches (when desired), keyboard and velocity split, MIDI specifications, etc. The VZ-1 features 64 operation memories which allow onboard storage of up to 64 different keyboard setups.
ENVELOPE	A voltage which changes as a function of time. Envelopes are generally triggered by controllers, and are used to shape the amplitude (volume) and pitch of a note.

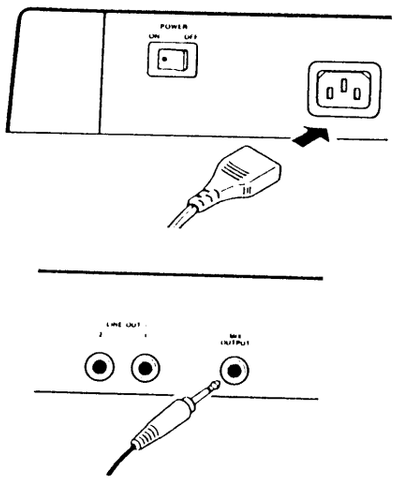
Plug In and Play!

A Quick Course in VZ-1 Performance

This section is provided for those users who want to "plug in and play" VZ-1 presets as soon as it's out of the box, and plan to study the details of the VZ-1's advanced operations later. It is intended to provide only the most basic information, so be sure to read the following sections of this manual once you've made some noise!

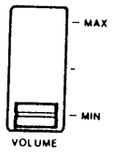
Once you've unpacked your new VZ-1, place it on a stable stand or surface.

Make sure that the power switch on the back panel is turned OFF, and then connect the VZ-1's accessory power cord to an outlet with the proper voltage rating.

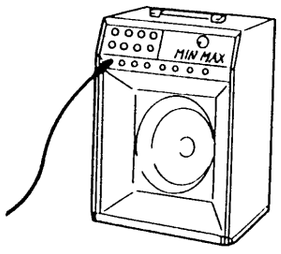


Next, connect the VZ-1's MIX OUTPUT channel to an amplifier with the accessory connecting cable. (There's no need to use an amplifier if you connect headphones to the headphone jack.)

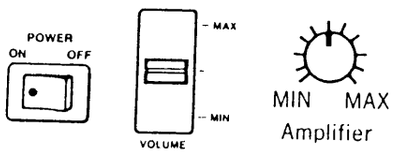
Adjust the VZ-1's volume level to MIN with the VOLUME slider.



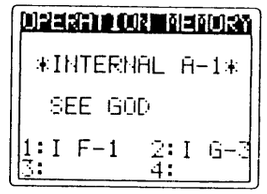
After making sure that the VZ-1 is connected to the amp, turn the amp's volume to MIN and then turn the amplifier on.



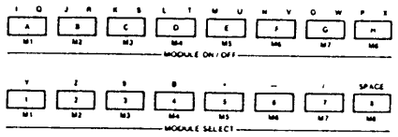
Now, turn ON the VZ-1 with the power switch on the rear panel and adjust both amplifier and VZ-1 volume levels appropriately.



Notice that when you turn ON the VZ-1, the first (A-1) onboard OPERATION MEMORY sound (SEE GOD) is selected.



Notice that this sound is identified by a letter and a number ("A" and "1"). In this state, you can select any of the 64 onboard OPERATION MEMORY sounds contained in the VZ-1 RAM memory by using the bank selectors (A through H) and number keys (1 through 8).



The sounds in the OPERATION MEMORY mode are "combined" sounds, which have been created using up to 4 different VZ-1 "patches."

Try playing a number of these sounds - how about H-5 - "BEAUTY/BEAST." Try playing this sound with a light touch and then a heavy touch. Now try pressing a key down hard after you've brought it to the end of its normal stroke. You're hearing just a few examples of the VZ-1's advanced performance capabilities. A variety of VZ-1 effects, keyboard split settings and velocity split settings are programmed in these OPERATION MEMORY sounds.

Ready to hear some individual patches? Just press the NORMAL key. You can now select from the 64 internal patches contained in the VZ-1 RAM memory. As with the OPERATION MEMORY sounds, you can select any of the 64 INTERNAL sounds contained in the VZ-1 RAM memory by using the bank selectors (A through H) and number keys (1 through 8).

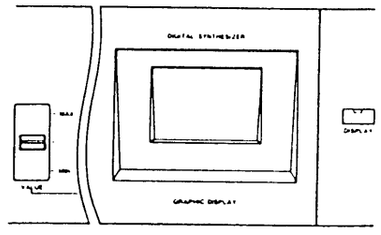
Try playing a number of these sounds as well - lead synth sounds? Try E-1 through E-6. Brass or strings sounds? Try any of the bank "B" sounds. For bass sounds, try D-1 through D-4. You'll be amazed at these realistic instrument sounds.

As you can tell by now, the VZ-1 features a wide range of useful instrument sounds and effects. But that's only the beginning. It's a powerful synthesizer that lets you create and instantly recall up to 256 sounds and keyboard setups for unmatched sonic and performance versatility.

To make full use of the VZ-1's power sound synthesis capabilities, be sure to read the remaining sections of this manual.

* To adjust graphic display brightness

The VZ-1's liquid crystal graphic display can be adjusted to various degrees of brightness for clear viewing under virtually any lighting condition. To adjust display brightness, hold down the DISPLAY key and move the VALUE slider.



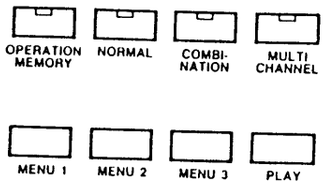
VZ-1 Theory: Flow of Operations

Although the VZ-1 features an extremely complex operating system, it has been designed so that actual operations are quite simple - after a few hours you'll be amazed at how simple the VZ-1 is to operate, and how versatile it is.
In order to appreciate the beauty of the VZ-1, it's important to have a clear initial understanding of its basic "flow of operations" - in other words the basic order of operations you will probably want to follow to make the most of the VZ-1.

Simply speaking, VZ-1 operations can be divided into four different "modes" - which, as you might expect, correspond to the four modes listed on the front panel of the VZ-1 - the **NORMAL** mode, the **COMBINATION** mode, the **OPERATION MEMORY** mode, and the **MULTI CHANNEL** mode.

You can select a MODE by pressing the corresponding mode key, and then select any MENU (or the PLAY sub-mode) with the MENU keys (or PLAY key).

For a clear understanding of each, take a few moments to read through the following text.



NORMAL MODE

The NORMAL mode is what you might think of if you've used a "normal" single-patch synthesizer that does not feature the extensive sound layering and memory capabilities of the VZ-1.

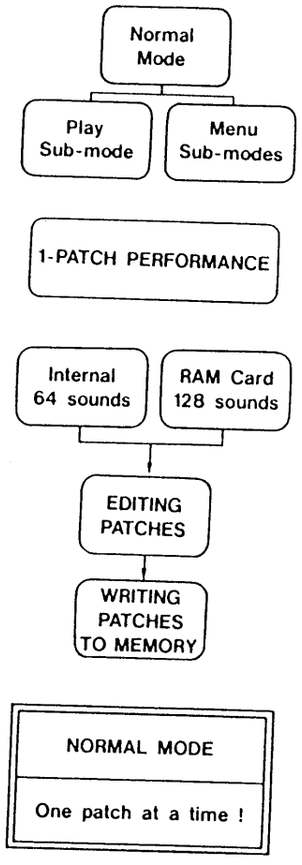
The NORMAL mode can be further broken down into two **sub-modes** - the **PLAY** mode and **MENU** mode. The PLAY mode is selected for normal performance, while the MENU mode(s) is selected for further editing of sound and effect data. In the **PLAY** sub-mode, you can freely choose any one of the VZ-1's 64 preset sounds or RAM card sounds, edit it, and use it in performance.

The NORMAL mode is the basic performance mode, where "patches" created through the VZ-1's modular sound source system can be selected and output individually for 1-patch performance. You can make use of the wide range of VZ-1 sound effects in this mode, for expanded performance versatility.

You can also use the NORMAL mode to create new patches by altering values for existing patches and writing them in either the internal or card memory. Or create entirely new sounds by initializing a memory area and programming values from "scratch" (initialized data).

Once you've created sounds you want to save, you can write them to one of 64 internal memory areas in the NORMAL mode, or to an optional RAM card which holds as many as 128 sounds.

One important thing to remember when you select the NORMAL mode is that you're working with only **1 patch at a time** - you can recall one patch at a time, edit one patch at a time, perform with one patch at a time, and write an individual patch to memory.



COMBINATION MODE

The COMBINATION mode is a **"buffer"** (for those with computer experience), or **"work area"** where you can "combine" the patches you've created in the NORMAL mode to make detailed, multi-timbral keyboard setups featuring keyboard split point, velocity split specifications, and individual effect specifications for each patch in the setup.

The COMBINATION mode can be further broken down into two **sub-modes** - the **PLAY** sub-mode and **MENU** sub-modes.

The PLAY sub-mode is selected for normal performance, while the MENU sub-modes are selected for further editing of sound, effect, and keyboard setup data.

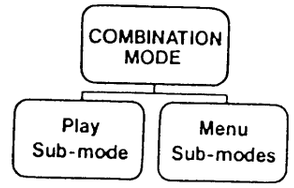
In this work area, you can select up to 4 different patches created in the NORMAL mode (preset, or those you've created), and arrange them freely to create a multi-timbral keyboard setup. The "arrangement" of these sounds is accomplished by choosing from any of 8 different KEY ASSIGN settings, which feature both SPLIT and LAYERED patch arrangements (see page 81).

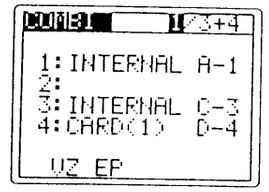
A variety of VZ-1 functions can be used to determine keyboard split points, as well as velocity split for each patch in the sound.

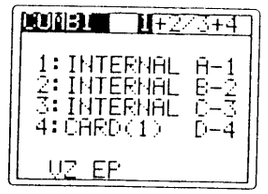
Effects can also be set individually for each patch in this mode. What's more, relative amplitude levels can be set for each patch, allowing total control of "balance" within the multi-patch sound.

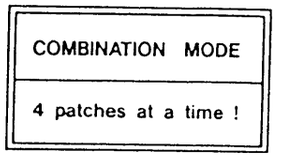
The VZ-1 is designed so that you can quickly and conveniently arrange the patches you use in the multi-patch sound - if you don't like what you hear, you can choose a replacement patch or delete it from the sound altogether.

One important thing to remember when you select the COMBINATION mode is that you're working with **up to 4 patches at a time.** Another important point is that the COMBINATION mode is only a "work area," where you can "work" on one "combined" (multi-patch) sound at a time.









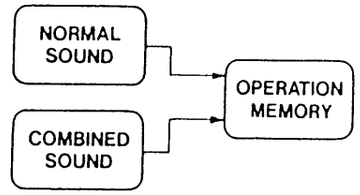
OPERATION MEMORY MODE

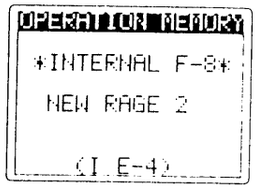
Once you've created a sound you want to save - an individual patch in the NORMAL mode (in internal or card memory) or a combined sound in the COMBINATION mode, you can write them to one of 64 built-in Operation Memories.

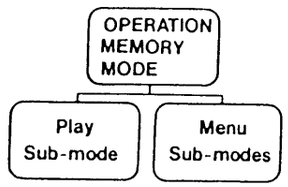
The **OPERATION MEMORY** mode is used to memorize and recall not only the individual patches and combined sounds created in the first two modes, it also holds sound-related details of effect and control panel settings. This is where you "store" the keyboard setups and patches you've created, for instant recall during performance.

This mode is actually used in concurrence with the NORMAL and COMBINATION modes, as it stores and recalls data which have been created in them.

The OPERATION MEMORY mode can be further broken down into **sub-modes** - the **PLAY** sub-mode and **MENU** sub-modes. The PLAY mode is selected for normal performance, while the MENU modes are selected for further editing of sound and effect data in the selected operation memory.



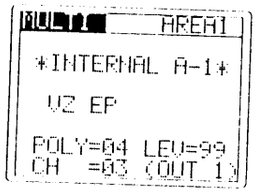




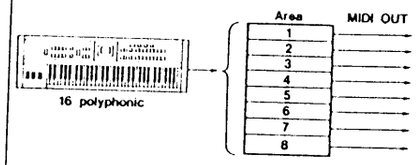
MULTI CHANNEL MODE

The **MULTI CHANNEL** mode is basically a performance mode, which makes advanced use of MIDI - the Musical Instrument Digital Interface.

The VZ-1 is capable of receiving MIDI performance messages in a number of ways; (1) With 16-note polyphony, wherein all notes and performance data transferred using the same MIDI channel (MIDI mode 3-omni off/poly), and (2) With 8-note polyphony, wherein each of the MIDI "Multi-Channel Area 1-4 or 5-8" is assigned an individual, independent timbre with 2-note polyphony.



Each AREA can be assigned an independent sound, a polyphonic value (maximum number of note which may sound at one time for the specified area), output level, and the MIDI Send/Receive channel number.



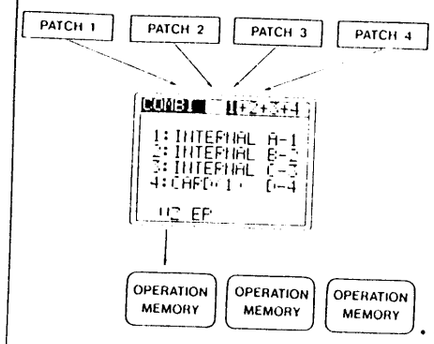
Through this operation, you can freely set up to 8 polyphonic MIDI channels, however it's important to remember that the VZ-1 polyphony remains unchanged - 16 notes maximum. Because of this, the sum polyphonic value for all 8 Multi Areas is - drum roll please - "16."

Now that you understand the basic theory of VZ-1 operations, the "BIG" picture becomes clearer;

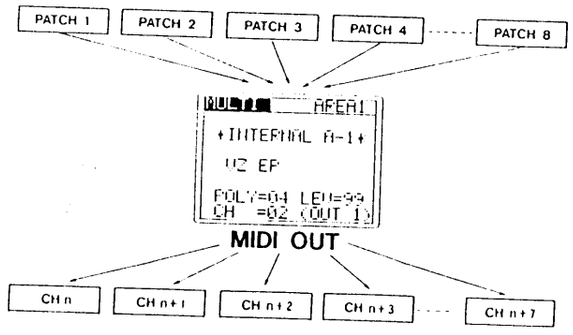
1 —Write, edit and recall individual patches using the **NORMAL** mode.

2 —"Combine" patches to make multi-timbral keyboard setups (combined sounds) in the **COMBINATION** mode. (Remember that you can write and edit patches individually as in the NORMAL mode as well.)

3 —Write patches and combined sounds to any of 64 operation memories and recall them for performance in the **OPERATION MEMORY** mode.



4 —Create up to 8 polyphonic MIDI "Multi Areas" in the **MULTI CHANNEL** mode.



VZ-1 Theory: iPD Modular Sound System

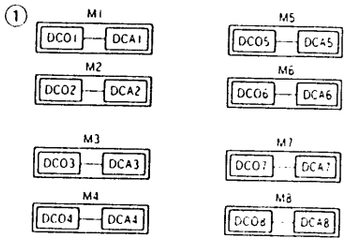
At the heart of the VZ-1's amazing sound synthesis capabilities is an all-new "iPD" (interactive Phase Distortion) sound source. In order to get the most out of your VZ-1, it is vitally important that you understand at least the basic theory behind this new sound source.

MODULES

The iPD sound source system actually consists of 8 independent **modules** (M1 to M8).

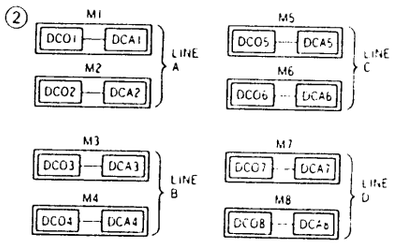
Each module contains a DCO and a DCA, and is capable of generating independent waveforms. (①) If you're familiar with analog synthesis, you can think of the modules as oscillators with controls. In the iPD system, the wave generated by any module can be used in either of two ways;

1 - to produce audible sounds
2 - to modify waves generated by other modules

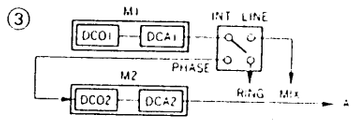
① 

LINES

Generally speaking, the 8 sound source modules work in associated pairs that are called **"Internal Lines,"** or simply **"lines."** There are 4 internal lines - A, B, C and D, as shown to the right. (②)

② 

The waveforms generated by both modules in any line can be used together in three different ways. The waveforms can be mixed, or one of the waveforms can be used to modulate the other for RING modulation or PHASE, as diagrammed at the right. (③)

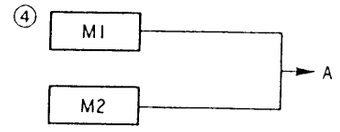
③ 

To show how the modules in each line are interrelated, let's analyze the relationship between the two modules which make up LINE A.

LINE A consists of two different modules - M1 and M2. While these modules are entirely independent and generate totally independent waveforms, they can be utilized together in any of three different output formats - **MIX** (mixed output), **RING** (ring modulation) and **PHASE** (phase).

MIXED WAVEFORM OUTPUT

When MIX is selected, the waveforms generated by M1 and M2 are output together, according to the formula given below. (④)

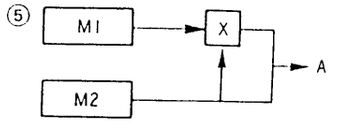
④ 

MIX: M1 + M2

This may look a bit complex at first, but it's really not. It may be easiest to think of M1 and M2 as individual oscillators (which they are). In the MIX format, both of these oscillators sound together.

RING MODULATION

These same two waveforms can also be output using RING MODULATION, which is created according to the formula shown below. (⑤)

⑤ 

RING MOD: M2 + M2 × M1

You've probably heard ring modulation - even if you don't recognize the term. Typically, it creates a "clangorous" or metallic sound and is often used in synthesizing gongs, bells and other ringing percussive sounds.

PHASE

The 2 waveforms in LINE A (M1 and M2) can also be output using PHASE, according to the formula shown below. (⑥)

PHASE: M2(M1)

In this format, only one oscillator is heard, as one oscillator is used to modulate the other. In this case, M2 is produced using M1 as the phase to "read" the M2 waveform.

The degree of RING and PHASE effect is dependent on the amplifier (DCA) envelope of related modules. (In addition, to amp envelope, the degree of changes in sound (waveform) are affected by amp envelope-related parameters such as key Follow, Velocity, etc.) (⑦)

Naturally, these same functions and formulas apply to all 4 internal lines - LINE A, LINE B, LINE C and LINE D. And they can be used to modify the other Internal Lines through **External Phase** processing.

External Phase

When the External Phase format is selected, the line output of the two modules (M1 and M2 in our example) is used as the phase of the second module in the succeeding internal line - M4 in LINE B, in our example. (⑧)

Now that you have a basic grasp of how the system is organized, you can start to imagine just how versatile the VZ-1 actually is. Because of the relationships between the sound source modules, you can create patches which contain independent sounds from each module, or use modules to modulate other modules. Theoretically, you can actually use modules 1 through 7 to modulate module 8, so that the only sound you actually hear is output through module 8!

To illustrate this more closely, take a look at the following examples.

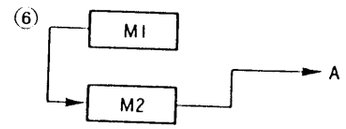
(EXAMPLE 1)

In this state the internal line of both LINEs A and B are set to MIX - i.e. the waveforms of both modules in each line are output "mixed" together, as shown on the display. (⑨) (⑩)

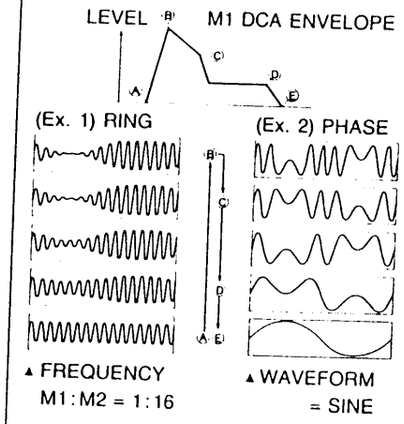
If, in this state, EXTERNAL PHASE from LINE A is specified, the display changes to that shown on the right, and the resulting waveform can be output from LINE A. (⑪)

Remember that LINEs which are used as external phase do not sound - they simply become the phase of the succeeding line. In our example, LINE A does not sound, but becomes the phase of LINE B.

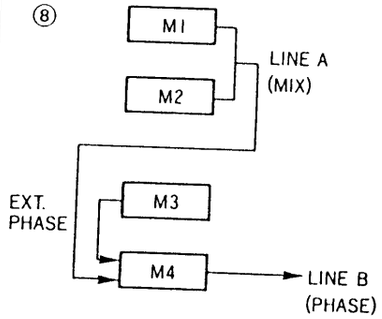
⑥



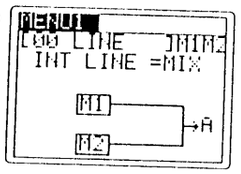
⑦ Diagram of relationship between DCA ENVELOPE and timbre.



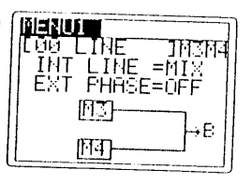
⑧



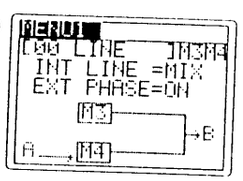
⑨



⑩



⑪



(EXAMPLE 2)

In this state, the internal line of LINE A is set to MIX, while LINE B is set to PHASE - i.e. M3 becomes the phase of M4. (⑫)

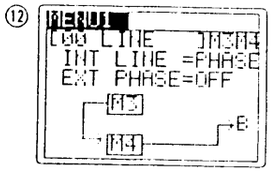
If, in this state, EXTERNAL PHASE from LINE A is specified, the display changes to that shown on the right, and the resulting waveform can be output through LINE B. Once again, LINE A does not sound, but is used only as the phase of LINE B. (⑬)

To make this a bit clearer, think of how a guitar player uses preamp stages to create distortion. With only one volume control, the guitarist must be VERY LOUD to overdrive his amp and get a warm, distorted sound. However if he adds a preamp or has a master volume control, he can overdrive his amp and still maintain a reasonable volume level. (⑭)

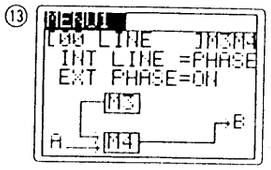
By linking more amplifiers, the guitarist could theoretically create an incredible singing "buzz", as the distortion can be compounded with each volume control. (⑮)

The VZ-1 modules work much in the same way - with only one oscillator you can produce only one sound. But with 8 independent oscillators, you can create patches with varying degrees of complexity - using the oscillators together to create a "fat" layered patch consisting of sounds from all 8 modulators, or to create an individual sound output from a single oscillator with a "chain" of modulation stretching from M8 all the way back to M1. In essence, the modules used to create modulation are "overdriving" the output modules. (⑯)

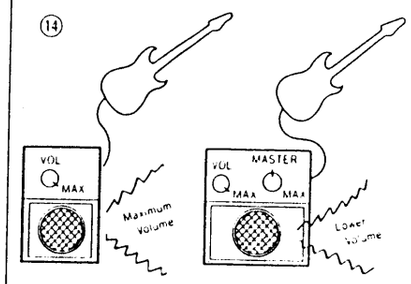
⑫



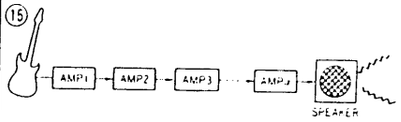
⑬



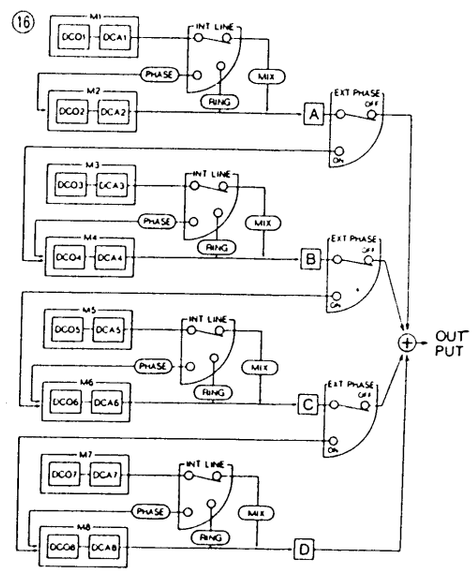
⑭



⑮



⑯



The VZ-1 lets you use all 8 modules entirely independently - using combinations of MIX, RING and PHASE output from each LINE to create a complex sonic matrix which is called a "patch". Once again, remember that a "patch" is simply the completed tone data coming from modules 1 through 8. Or, in simpler terms, an individual "sound" being output from the VZ-1.

The number of possible combinations used to create a patch boggles the mind, when you consider the versatility of the control parameters which are used to shape the waveform being output from each module. (⑰)

⑰

MODULE	EXT PHASE	INT LINE	LINE A~D
M1 M2		MIX	A=M1+M2
		RING	A=M2+M1×M2
		PHASE	A=M2(M1)
M3 M4	OFF	MIX	B=M3+M4
		RING	B=M4+M3×M4
		PHASE	B=M4(M3)
	ON	MIX	B=M3+M4(A)
		RING	B=M4(A)+M3×M4(A)
		PHASE	B=M4(M3+A)
M5 M6	OFF	MIX	C=M5+M6
		RING	C=M6+M5×M6
		PHASE	C=M6(M5)
	ON	MIX	C=M5+M6(B)
		RING	C=M6(B)+M5×M6(B)
		PHASE	C=M6(M5+B)
M7 M8	OFF	MIX	D=M7+M8
		RING	D=M8+M7×M8
		PHASE	D=M8(M7)
	ON	MIX	D=M7+M8(C)
		RING	D=M8(C)+M7×M8(C)
		PHASE	D=M8(M7+C)

Operating System Controls

In some ways, your VZ-1 is very similar to a computer, as it is capable of storing and generating a large amount of digital sound data. This "data processing" is maintained by the VZ-1 "Operating System," which you can think of as a collection of system programs that control the overall operation of the VZ-1.

The main interface with the VZ-1 operating system can be found in the menu **functions** which can be called up on the VZ-1's built-in graphic display. These functions contain a number of **parameters**, which determine the various characteristics of VZ-1 sounds. In fact, sound synthesis on the VZ-1 basically consists of inputting **values** for these parameters.

With a computer, you generally enter a certain program, and use a cursor to move to different positions in the displayed page, and use the keyboard to input commands, values, text, etc. (this is, of course a simplified explanation.)

The VZ-1 works much in the same way, and it features a number of basic "Operating System Controls" which are used to perform the same functions a computer keyboard or mouse would perform.

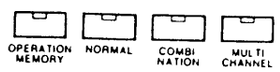
Take a look at the MENUs listed on the front panel of the VZ-1 - this "menu hierarchy" gives you a bird's-eye view of how VZ-1 MENUs and FUNCTIONs are organized. Notice that these menus are divided into sections, with the relative MODEs listed on the left, and the various FUNCTIONs on the right.

MENU 1		PARAMETER
NORMAL COMBINATION	DCO	00 LINE
		01 WAVE FORM
		02 DETUNE
		03 ENVELOPE
		04 ENV DEPTH
		05 KF LEVEL
		06 VEL LEVEL
		07 VIBRATO
		08 OCTAVE
	DCA	09 ENVELOPE
		10 ENV DEPTH
		11 KF LEVEL
		12 VEL LEVEL
		13 TREMOLO
		14 AMP SENS
		15 TOTAL LEVEL
	DCO/DCA	16 KF RATE
		17 VEL RATE
		18 VOICE NAME

MENU 2		EFFECT
OPERATION MEMORY	00	OPERATION NAME
NORMAL	01	PORTAMENTO/SOLO
COMBI-NATION	02	PITCH BEND
MULTI CHANNEL	03	AFTER TOUCH
	04	DEF WHEEL 1
	05	DEF WHEEL 2
	06	FOOT VR
COMBI-NATION	07	LEVEL
	08	PITCH
	09	SPLIT POINT
	10	SUSTAIN PEDAL
	11	VEL SPLIT
	12	VEL INVERSE
	13	POS CROSSFADE
	14	DELAY TRIG
	15	VIBRATO INV
	16	TREMOLO INV
	17	COMBI COPY
MULTI CHANNEL	18	PITCH

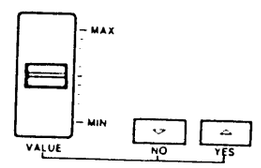
MENU 3		TOTAL CONTROL
OPERATION MEMORY	00	TUNE/TRANSPOSE
NORMAL	01	MEMORY PROTECT
COMBI-NATION	02	SAVE/LOAD
MULTI CHANNEL	03	MIDI CHANNEL
	04	MIDI DATA
	05	PITCH BEND
	06	CARD FORMAT
NORMAL	07	PRESET CALL

To work in the VZ-1 operating system, you first choose what **MODE** you want to work in, by pressing one of the MODE keys.

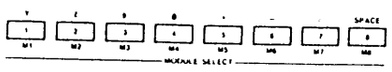


After you've selected the mode, you must specify what **MENU** you want to enter, by pressing one of the MENU keys.

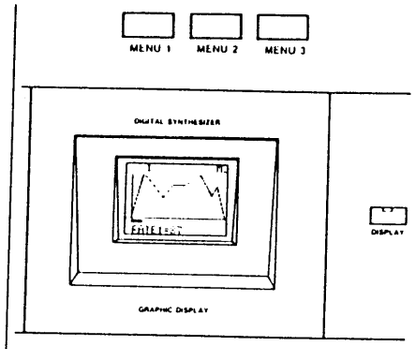
Now that you've specified the MODE and MENU, choose the **FUNCTION** containing the parameters that you want to access by using the VALUE controls - either the Value Slider or the Value (YES/NO) keys.



With some functions, you'll notice a module indicator at the top right-hand corner of the display. These indicators appear only when the selected function is set for each sound source module. To select the module you want to edit, you simply press the corresponding **MODULE SELECTOR.**

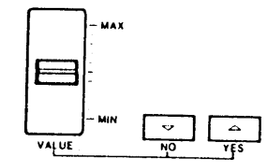


When you've moved to the desired function and selected the module you want to edit, you can access the parameters by pressing the related **MENU key** once again. With this, you've "accessed" the parameters contained in the function, and are now free to move through them with the cursor keys. In cases where functions feature graphic editing capabilities, you can move automatically into graphic editing without pressing the MENU key by pressing the DISPLAY key (see page 28).

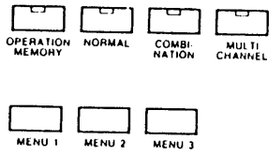


To move through the various PARAMETERS contained in any function, you use the CURSOR keys. These keys let you move up or down, and right or left in the lower section of the menu.

Once you've moved to a parameter which you want to set or edit with the cursor, you can use the VALUE controls to input values. Use the slider to input approximate values, and the value keys to make more exact value specifications.



When you want to exit from any function, menu or mode, you can simply press any of the MODE or MENU keys. Notice that when you reselect a particular MENU (MENU 1, for example), the function you last selected in that MENU is automatically recalled.



Difficult? Not at all! If it's not entirely clear, try going through the practice exercise found on page 20. It will familiarize you with the "Operating System Controls" - the controls used to "communicate" with the VZ-1 operating system.

Menus and Functions

Within each VZ-1 Menu you will find a number of "Functions." Each of these functions is further broken down into "parameters," which are constants that have changeable values or settings.

For example, in MENU 1, you can select from a variety of functions which affect the characteristics of the sound produced by each individual module (oscillator). To alter the characteristics of the sound, you simply alter the values of the various parameters contained in each MENU 1 function.

MENU 1			PARAMETER
NORMAL COMBI-NATION	DCO	00	LINE
		01	WAVE FORM
		02	DETUNE
		03	ENVELOPE
		04	ENV DEPTH
		05	KF LEVEL
		06	VEL LEVEL
		07	VIBRATO
		08	OCTAVE
	DCA	09	ENVELOPE
		10	ENV DEPTH
		11	KF LEVEL
		12	VEL LEVEL
		13	TREMOLO
		14	AMP SENS
		15	TOTAL LEVEL
	DCO/ DCA	16	KF RATE
		17	VEL RATE
		18	VOICE NAME

In MENU 2, you can select from a variety of functions which control the VZ-1's built-in sound effects. To alter the way that sounds are affected by these effects, you simply alter the values of the various parameters contained in each MENU 2 function.

MENU 2		EFFECT
OPERATION MEMORY	00	OPERATION NAME
NORMAL	01	PORTAMENTO/SOLO
COMBI-NATION	02	PITCH BEND
	03	AFTER TOUCH
MULTI CHANNEL	04	DEF WHEEL 1
	05	DEF WHEEL 2
	06	FOOT VR
COMBI-NATION	07	LEVEL
	08	PITCH
	09	SPLIT POINT
	10	SUSTAIN PEDAL
	11	VEL SPLIT
	12	VEL INVERSE
	13	POS CROSSFADE
	14	DELAY TRIG
	15	VIBRATO INV
	16	TREMOLO INV
	17	COMBI COPY
MULTI CHANNEL	18	PITCH

In MENU 3, you can select from a variety of functions which control VZ-1 performance. These are known as "total control" functions, and include such parameters as keyboard tuning, MIDI settings, etc.

MENU 3		TOTAL CONTROL
OPERATION MEMORY	00	TUNE/TRANSPOSE
NORMAL	01	MEMORY PROTECT
COMBI-NATION	02	SAVE/LOAD
MULTI CHANNEL	03	MIDI CHANNEL
	04	MIDI DATA
	05	PITCH BEND
	06	CARD FORMAT
NORMAL	07	PRESET CALL

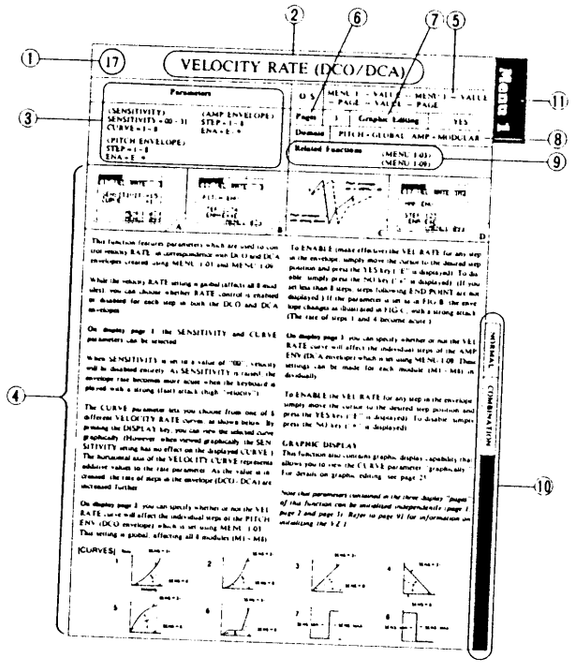
Take a look at the MENUs listed on the front panel of the VZ-1 - this "menu hierarchy" gives you a clear view of how VZ-1 MENUs and FUNCTIONs are organized.

MENU 1 — SOUND EDITING FUNCTIONS
MENU 2 — EFFECT-RELATED FUNCTIONS
MENU 3 — TOTAL CONTROL FUNCTIONS

It's important to remember that not all FUNCTIONs can be accessed in every MODE - notice that the menus are divided into sections, with the relative MODEs listed on the left. Remember that when you choose a particular function, the related operational mode must first be specified. You'll also notice that each FUNCTION INDEX lists the operational modes in which the function operates.

About Function Indexes

In the following section, you will find information on each "function" for all three VZ-1 menus. The function "indexes" listed on the following pages contain a variety of important information on the function and its parameters, as shown below;



①Function Number
This number corresponds to the number of the function on the VZ-1's front panel menu(s).

②Function Name
This name corresponds to the name of the function as it is listed the VZ-1's front panel menu(s).

③Individual parameters and value range
This list shows all the parameters contained in the selected Function, as well as the range of values or settings which can be made for each parameter. For example, the SENSITIVITY parameter in the VELOCITY RATE function can be set at any level between 0 and 31.

④Explanation of function/parameters
This text provides a brief explanation of the purpose of the function, as well as its individual parameters.

⑤O/S (Operating System) control operation
Indicates the basic keys and controls used to select the function and move through the display hierarchy to edit settings for each parameter.

⑥No. of display pages
Indicates the number of display "pages" which are used for the Function. In this case, the VELOCITY RATE function features 3 display pages - in other words, some parameters for this function are accessed on the second and third display pages. Subsequent pages can be displayed by pressing the PAGE key. (See "Display Pages," page 21.)

⑦Graphic display capability
Indicates whether or not the function or its parameters can be viewed graphically on the VZ-1's LCD display. When "YES" is indicated, you can access graphic display by pressing the display key. (See "Graphic Display," page 25.)

⑧Domain
Indicates the operational "domain" in which function settings are effective. In some functions, settings are "global," in which case the setting affects the entire operating system. In some functions, settings can be made for each iPD module, in which case the domain is "modular." In other cases, settings are "linear" - or valid for each iPD LINE, per "area" - or valid for each MIDI area, "layered" - or valid for layered sounds in the COMBINATION mode, etc.

⑨Related Functions
Lists the other VZ-1 functions that are closely interrelated with the selected function. These are also listed on the VZ-1 display in many cases.

⑩Modes
Lists all of the "operational modes" - NORMAL, COMBINATION, etc.- in which the function operates. (Note how the MENUs are organized on the front panel of the VZ-1. The left-hand column of the menu hierarchy shows the MODEs related to the FUNCTIONs on the right.)

⑪Menu
List the menu 1 ~ 3, and it's useful for you searching Index.

REMEMBER....
These indexes provide only basic information on each function and parameter. Many of these functions and parameters are interrelated, and it would take literally volumes to provide a technical explanation of how they actually affect VZ-1 sounds. To gain a practical understanding, be sure to go through the PRACTICE EXERCISE found on page 20.

Function Index Practice Exercise

About the Function Index Practice Exercise

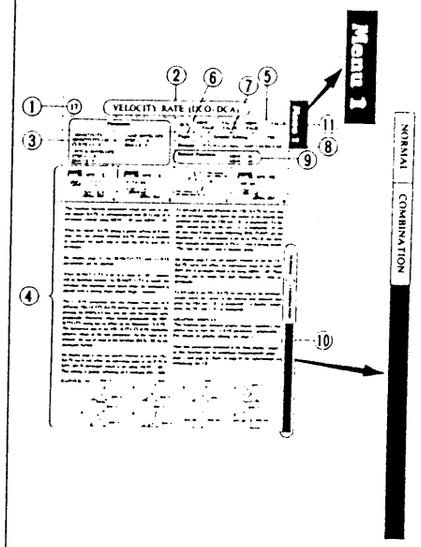
The following is an example of how you can use VZ-1 Function Indexes as a guide to actual editing operations. Be sure to go through this exercise carefully, executing VZ-1 operations as you go. This will not only provide you with an understanding of how you can utilize the indexes, but also a basic understanding of VZ-1 editing operations.

Practice Exercise: How to use the VELOCITY RATE Function Index when editing VZ-1 Velocity Rate parameters.
For this example, let's assume that you want to "edit" the VELOCITY RATE for the DCA envelope. Take a look at the MENUs on the front panel of the VZ-1. Here you'll find the "VEL RATE" function listed in MENU 1. Notice that it affects both DCO and DCA envelopes.

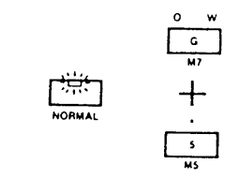
MENU 1		PARAMETER
NORMAL COMBINATION	DCO	00 LINE
		01 WAVE FORM
		02 DETUNE
		03 ENVELOPE
		04 ENV DEPTH
		05 KF LEVEL
		06 VEL LEVEL
		07 VIBRATO
		08 OCTAVE
	DCA	09 ENVELOPE
		10 ENV DEPTH
		11 KF LEVEL
		12 VEL LEVEL
		13 TREMOLO
		14 AMP SENS
		15 TOTAL LEVEL
	DCO/ DCA	16 KF RATE
		17 VEL RATE
		18 VOICE NAME

VZ-1 Function Indexes are arranged in three main sections, corresponding to the three operational MENU sub-modes. Notice that the menu numbers are listed on a "tab" at the upper edge of the page (item ⑪).

The related MODEs are listed at the bottom edge of the function index page (item ⑩). In this case, MENU 1-17 (VELOCITY RATE) can only be used when either the NORMAL mode or COMBINATION mode is first selected. Since the goal of this example is to edit the DCA envelope RATE parameters, you'll want to choose a patch which is audibly "dependent" on these settings. Try choosing INTERNAL patch number G-5 - "VZ TOUCH." Play some notes with varying degrees of key velocity, and take note of how velocity affects this sound. Once you've got it down, go on to procedure 1.



1 For this example, we'll work in the NORMAL mode, so first press the NORMAL key.



Take a look at item ⑤ on the function index. This lists the Operating System controls that are used in editing the parameters contained in this function. You'll find this handy when working in any VZ-1 function. (Be sure to refer to this list as you work through this exercise as well.)

⑤

O/S	MENU 1 — CURSOR — VALUE — PAGE

2 Next, specify that you want to work in the MENU 1 sub-mode by pressing the MENU 1 key.

If you've previously worked in the MENU 1 sub-mode, the function you selected last will automatically be recalled at this point. For our example, let's assume you last worked in MENU 1-06 (DCO VELOCITY LEVEL).

Notice that the function number flashes on the top line of the display (this indicates the "cursor" position). In this state, you can select function number with the VALUE controls (the value slider or value keys).

Now take a look at item ⑧ in the VELOCITY RATE Function Index. You'll notice that the "Domain" is listed as being "Global." This means that settings made in this function affect all VZ-1 sounds (as opposed to affecting only a single module, single line, etc.).

Many VZ-1 functions feature a "modular" domain. In these cases, a MODULE number will appear at the right of the display. This indicates the module that is presently selected ("M2" for example) - and any settings that are made will affect only this module. You can select a different module by pressing any MODULE SELECTOR.

3 Use the value controls to select MENU 1-17 (VEL RATE).

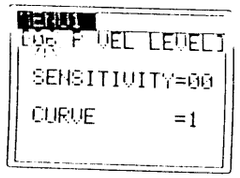
Look at item ③ in the index. Here are listed all the parameters contained in each function, as well as related information such as the range in which values can be set. You'll find this comes in handy in VZ-1 editing, as you can look up individual parameters easily without actually accessing a function on the VZ-1.

4 To "access" the parameters contained in this function, press the MENU 1 key once again.

Notice that the cursor now moves to the first parameter in the function - SENSITIVITY.

At this point, take a look at item ⑥ in the Function Index. Note that the selected function features a total of 3 "display pages" - which means that only some of the parameters contained in this function are presently displayed. The others can be accessed by pressing the MULTI AREA (PAGE/ZOOM) keys.

Try pressing the MULTI AREA keys - notice that you can "turn" display pages with these keys to select the parameters you want to edit.

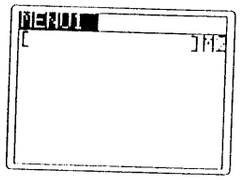


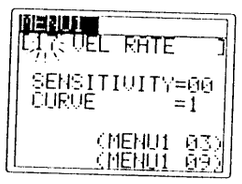
⑧

Domain	GLOBAL

⑧

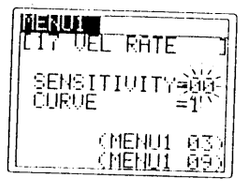
Domain	MODULAR





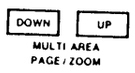
③

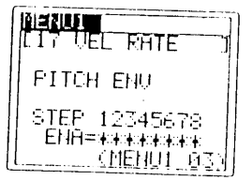
Parameters	
(SENSITIVITY) SENSITIVITY = 00 ~ 31 CURVE = 1 ~ 8	(AMP ENVELOPE) STEP = 1 ~ 8 ENA = E / •
(PITCH ENVELOPE) STEP = 1 ~ 8 ENA = E / •	



⑥

Pages	3





Finally, turn back to the first display page. Now look at item ⑦ in the index. Notice that this function features Graphic Editing capabilities. This means that at least some of the parameters contained in the function can be edited graphically. (In this case, only the parameters on the first page (SENSITIVITY and CURVE) can be edited graphically.)

5 If you want to edit graphically, simply press the DISPLAY key. For further information on Graphic Editing see page 25.

6 Return to digital editing by pressing the DISPLAY key once again.

On display page 1, the SENSITIVITY and CURVE parameters can be selected.

When SENSITIVITY is set to a value of "00", velocity will be disabled entirely. As SENSITIVITY is raised, the envelope rate becomes more acute when the keyboard is played with a strong (fast) attack (high "velocity").

7 Try changing the SENSITIVITY parameter value by using the VALUE controls. As shown in the Function Index, this parameter can be set between "00" and "31." Set it to a value of about "22."

The CURVE parameter lets you choose from one of 8 different VELOCITY RATE curves, as shown on the function index. (Note that whether SENSITIVITY is changed or not, the shape of the CURVE is not altered.)

8 Try changing the CURVE parameter value by using the VALUE controls. Set it at a value of "4" - then take a look at the curve by pressing the DISPLAY key. And return to digital editing by pressing the DISPLAY key once again.

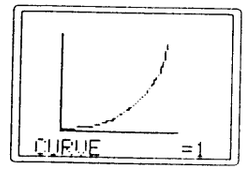
On display page 2, you can specify whether or not the VEL RATE curve will affect the individual steps of the PITCH ENV (DCO envelope) which is set using MENU 1-03. This setting is global, affecting all 8 modules (M1 - M8).

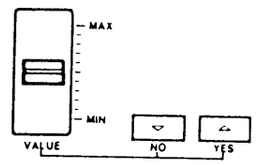
To ENABLE (make effective) the VEL RATE settings for any particular step in the DCO envelope, simply move the cursor to the desired step position and press the YES key.

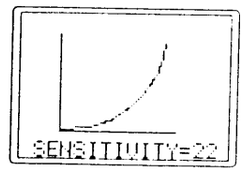
To DISABLE the settings, simply press the NO key.
For our example, however, skip this page and go to display page 3 (remember, our goal is to alter only **DCA**-related settings...).

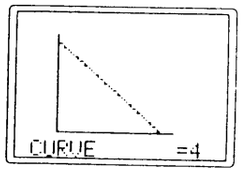
⑦

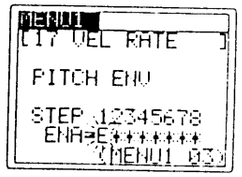
Graphic Editing	YES

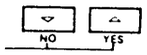












On display page 3, you can specify whether or not the VEL RATE curve will affect the individual steps of the AMP ENV (DCA envelope) which is set using MENU 1-09.

Notice that these settings can be made for each module (M1 - M8) individually, as indicated by the module number which appears at the upper right-hand corner of the display page.

You can select any module with the MODULE selectors.

For our example, try selecting MODULE 8 by pressing MODULE SELECT key #8. Then turn OFF all other modules by pressing the corresponding MODULE ON/OFF keys. In this way, you can "focus" on the DCA envelope for this individual module when editing, as others will not sound.

9 To ENABLE the VEL RATE for any step in the DCA envelope of the selected module (M8), simply move the cursor to the desired step position and press the YES key. To disable, simply press the NO key. For our example, try enabling the VEL RATE for all 4 active steps in the envelope.

Now, play a few notes and chords again. Notice how the changes in the RATE curve and sensitivity have affected the sound.

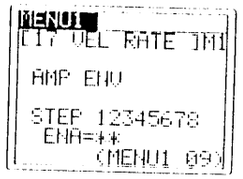
Next, take a look at item ⑨ in the function index. This section lists the VZ-1 functions which are closely related to the VELOCITY RATE function. In this case, both the DCO ENVELOPE (MENU 1-03) and DCA ENVELOPE (MENU 1-09) are listed. Naturally, the settings of these envelope functions will affect the VELOCITY RATE function, and vice-versa.

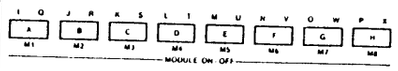
10 Next, turn ON all 8 modules by using the MODULE ON/OFF keys, and ENABLE the same curve and sensitivity for all steps in each module's AMP envelope.

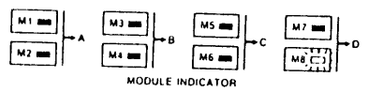
Again, play a few notes and chords and observe the changes in the overall sound.

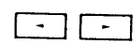
If you want to hear the "original sound" (the sound as it was before you edited), press the COMPARE/RECALL key. When the indicator is flashing, the original sound can be played. Press it once again to return to the edited version.

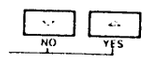
11 Since the domain of the settings made using these parameters is "modular" (settings made for each module independently), you may want to have a look at how the iPD modules are organized for this particular sound. This modular LINE configuration has a direct impact on the selected patch's sound, and you may often want to look at the line configuration when making editing decisions.

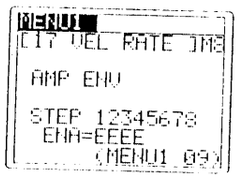






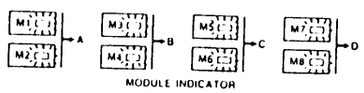




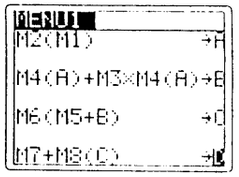


⑨

Related Functions	(MENU 1-03) (MENU 1-09)

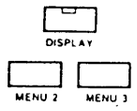


To access the LINE configuration when making modular parameter settings, simply press the LINE key.
Notice that the LINE configuration is shown as long as you hold down the LINE key.



12 For this example, assume that you've now finished editing and you want to move immediately to performance in the OPERATION MEMORY mode. To do so, simply press the **OPERATION MEMORY** key.

To exit to another mode, simply press the MODE key.
If you are editing graphically and want to exit to another MENU, you must first press the DISPLAY key to return to normal digital editing and then press the MENU key.



13 Now assume that you want to go back and edit this same function again (for some reason). To do so, simply press the NORMAL key followed by the MENU 1 key.

The last selected FUNCTION in every menu is held in memory and instantly recalled - note that 17 (VEL RATE) is recalled as soon as you press the MENU 1 key.

Although this example only covers a single function, the basic operations are the same for all VZ-1 functions. If you have any difficulties when working in another function, be sure to refer back to this example, as well as the "Graphic Editing" examples found on page 26.

For further information on the Operating System controls, refer to page 16.
For further information on Graphic Editing, refer to page 25.

VZ-1 Graphic Editing

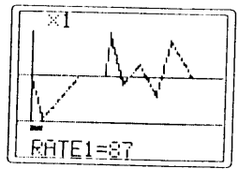
About Graphic Editing

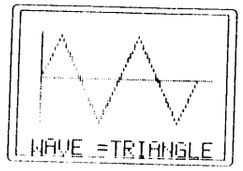
The VZ-1's graphic display can be used in a number of functions to provide a "graphic" view of parameter editing. You'll find those functions which feature graphic editing capabilities marked in the Function Indexes (see page 20).

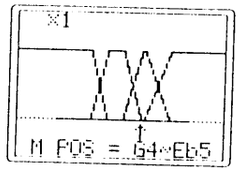
Naturally, the functions which can be edited graphically are those which can easily be expressed graphically as "curves" or envelopes - such as MENU 1-03 (PITCH ENVELOPE), MENU 1-13 (TREMOLO), and MENU 2-13 (POS CROSS FADE).

In many cases, you may find "graphic editing" easier and faster than "digital" editing. Through graphic editing, you can actually see - in real time - how changes in parameter values affect the display's graphic representations of envelopes, contours, etc. As the selected parameter is altered, the graphic image - and the sound - changes. For most people, this sort of editing is often easier to understand than digital editing, where all you have to work with is "numbers".

For a clearer understanding of graphic editing, be sure to go through the practice exercise found on page 26.



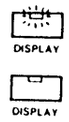




To use the graphic editing function

There are basically two points in the editing process where you can "enter" the graphic editing mode.

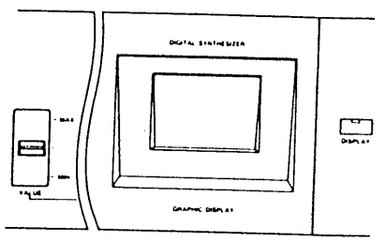
* Normally, you simply press the **DISPLAY** key after moving to the parameter level in any function (see example "A" on page 26). Notice that the DISPLAY key indicator lights when in the graphic editing mode. To return to digital (normal) editing, simply press the DISPLAY key once again so that the indicator goes out.



* You can also enter the graphic editing mode before moving to the parameter level of any function. Simply select the function you want to edit graphically and press the DISPLAY key - there's no need to press a MENU key (MENU 1 key, MENU 2 key, etc.) to "access" the function parameters. Note, however, that when you want to exit to the FUNCTION level of the display to choose a different function, you must first turn the graphic display function OFF (by pressing the DISPLAY key once again, and then press a MENU key, as with normal digital editing (see example "B", page 28).

To adjust graphic display brightness

The VZ-1's liquid crystal graphic display can be adjusted to various degrees of brightness for clear viewing under virtually any lighting condition. To adjust display brightness, hold down the DISPLAY key and move the VALUE slider.

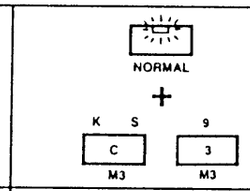


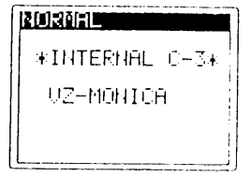
Graphic Editing Examples

The following examples will provide you with a basic working knowledge of the VZ-1's graphic editing function, including the controls used to operate it and actual operations. While operations in some functions are slightly different, you'll have no problem in using the graphic editing function if you work through these "practice exercises." To illustrate some of the differences in graphic editing between functions, there are two examples - A and B. It may be helpful to use these as a reference when using graphic editing with other functions.

EXAMPLE A: Changing the VIBRATO function (MENU 1-07) using graphic editing

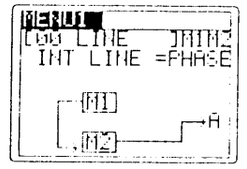
1. First, select internal patch "C3" (VZ-MONICA) in the NORMAL mode.



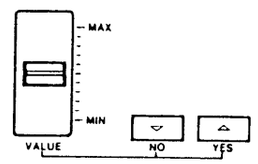


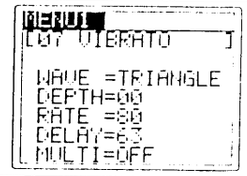
2. Next, press the MENU 1 key to specify that you want to edit a function contained in MENU 1.

Ex.

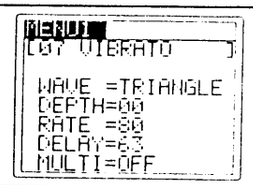


3. Now use the value keys or value slider to select function 07 - VIBRATO.

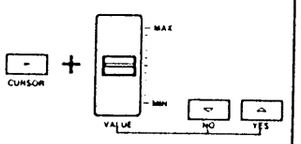


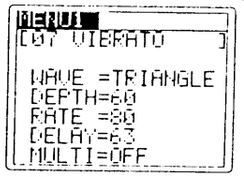


4. Access the function's parameters by pressing the MENU 1 key once again.



Notice that the DEPTH parameter is initially set to a value of "00." At this setting, no vibrato will be generated, so first move the cursor to the DEPTH parameter by pressing the cursor [►] key, and then set the DEPTH to a value of, say, "60."

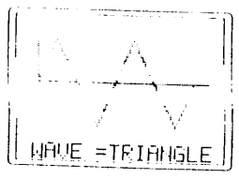




5. To specify GRAPHIC EDITING, press the DISPLAY key.

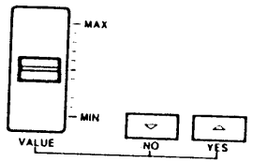
6. The display now shows you a graphic representation of the VIBRATO waveform - notice that it is initially set to **TRIANGLE** (indicated at the bottom of the display if you press the cursor [◄] key to select the WAVE parameter). The waveform shown graphically is, of course, also a "triangle" waveform.

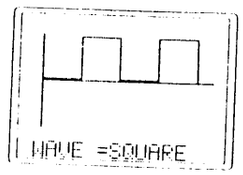
Hold down a key for a few moments (note that delay is set to "63" so it will take a couple seconds for vibrato effect to begin). Take note of the sound of the "triangle" vibrato waveform once it begins (and release the key on the keyboard).



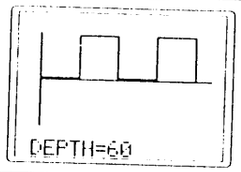
7. Using the cursor keys, select the WAVE parameter.

Then use the value keys (or slider) to change the WAVE parameter to a SQUARE wave. Notice that the graphic display changes each time you press the YES or NO key, showing all four possible waveforms which can be selected for this parameter. Now play a key and compare the sound of the square waveform vibrato.



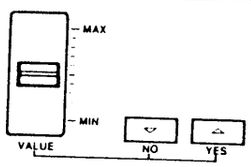


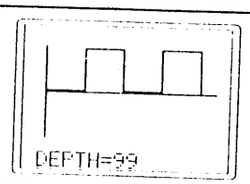
8. To edit the next (or any other) parameter in this function (DEPTH), simply use the cursor keys.



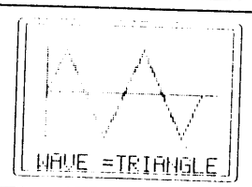
And then set the DEPTH to a value of, say, "99".

Note that even if other parameters are altered, the selected basic waveform does not change in shape or size.



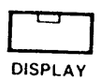


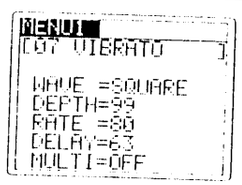
You can "compare" the edited sound (the "new" values you have specified) with the original sound at any point by simply pressing the COMPARE/RECALL key (The indicator is flashing). Press it once again to return to the edited version (see page 23).



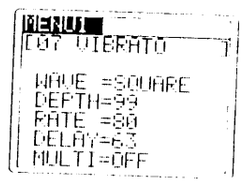
9. If, at any point in graphic editing, you want to return to normal digital editing, simply press the DISPLAY key once again so that the corresponding indicator goes out.

Note that the position in the display hierarchy is retained in this case.



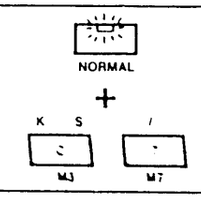


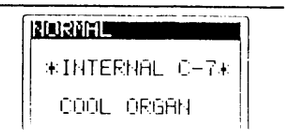
10. To exit to the FUNCTION position in the display menu ("07" in this case), you must first return to digital editing by pressing the DISPLAY key (perhaps you've already done this), and then press a MENU key. (You can also exit directly to any other performance mode by pressing a MODE key - such as NORMAL, COMBINATION, etc.)



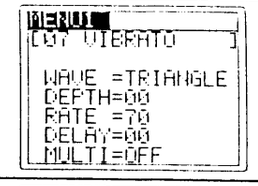
EXAMPLE B: Changing the DCA ENVELOPE (MENU 1-09) using graphic editing

1. First, select internal patch "C7" (COOL ORGAN) in the NORMAL mode.

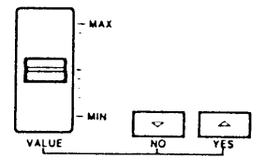


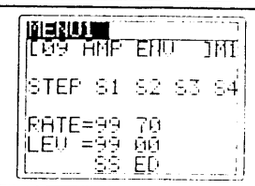


2. Next, press the MENU 1 key to specify that you want to edit a function contained in MENU 1.



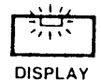
3. Now use the value keys or value slider to select function 09 - DCA ENVELOPE.

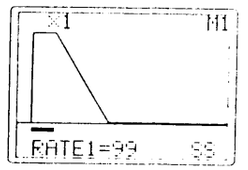




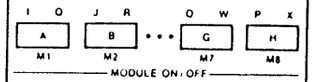
4. As stated above, you can move directly into graphic editing by pressing the **DISPLAY** key at this point.
(This does away with step "4" in EXAMPLE A)

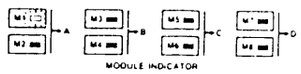
Notice that the display shows a 2-step amplitude envelope for the module which has been selected (this is a "modular" function - independent parameter settings can be made for each module). At the bottom of the display, the RATE of the first step in the envelope is indicated.





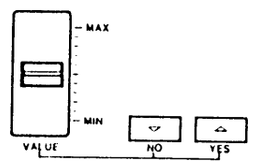
5. To get a clear understanding of how this envelope affects the sound of M1 (M1 should already be selected - if it isn't, press the M1 module selector), try turning OFF all other modules with the MODULE ON/OFF keys.

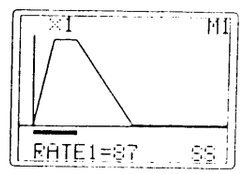




6. Next, try changing RATE of the first step with the value slider.

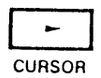
Try changing the rate to a number of different values - 99, 80, 60, 40, etc. Notice that as the value becomes lower, the RATE - remember, this is the slope of the selected step in the envelope - becomes less acute. Try playing a note at each different setting. Notice that the amplitude rises slower to its maximum - the LEVEL parameter in the first step. Finally set this parameter to a value of about 87.

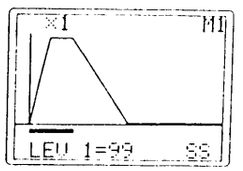




7. Select the next parameter - the LEVEL of the first step in the DCA envelope - with the cursor [►] key.

Notice that the LEVEL is initially set at a value of "99" - the maximum amplitude level in this case.

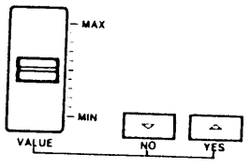


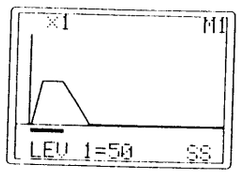


Try changing the LEVEL to a number of different values - 99, 80, 60, 40, etc. Notice that as the value becomes lower, the LEVEL - remember, this is the maximum value level reached in this step in the envelope - becomes lower, and the actual shape of the envelope changes in real time.

Try playing a note at each different setting. Notice that the maximum amplitude (volume) level reached in the selected step changes as the LEVEL setting changes.

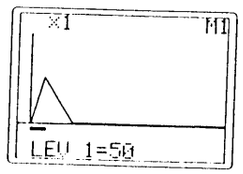
Finally, set this parameter to a value of "50."



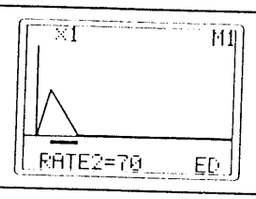


8. Notice the "SS" mark in the lower right-hand corner of the display. This indicates that the selected step is a "Sustain Point" (see page 42). For this example, remove this point by pressing the **INTERNAL/SUSTAIN** key.

Notice that the sustained section of the envelope (the "flat" peak) changes to a "point" (without a sustained level) when you remove the SS point. Play a note again - notice how the sound rises to its maximum volume level immediately and then drops off without sustaining (you may have to turn the VOLUME up to hear this...).

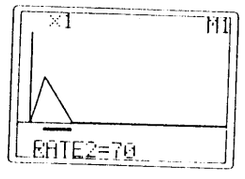


9. Select the next parameter - the RATE of the second step in the DCA envelope - with the cursor [►] key.

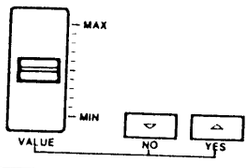


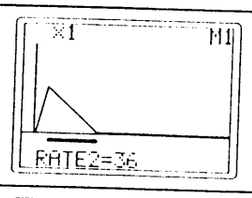
10. Notice that this step features an "ED" or end mark. This indicates that the selected step is the "last" step in the envelope.
For this example, cancel the ED point by pressing the CARD/END key.

Note that the ED point automatically moves to the last step in the envelope (step 8) when cancelled with the CARD/END key.

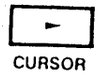


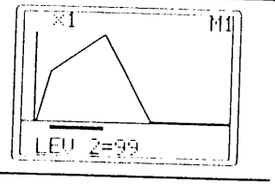
11. Set the RATE for step 2 to a value of approximately "36.".





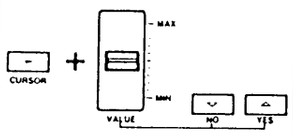
12. Next, move to the LEVEL parameter for step 2 with the cursor. Raise the LEVEL to a value higher than that of step 1 - "99" for example.

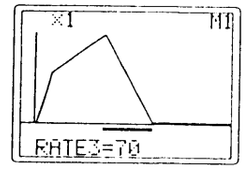




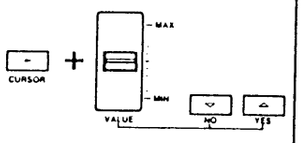
13. Next, move to the RATE parameter for step 3 with the cursor.

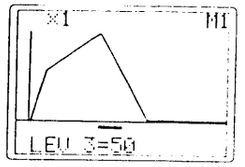
Try changing the RATE of step 3 to a number of different values. Notice the effect that this has on the sound. At a RATE of "30," for example, the sound's "decay" is very slow, however at a RATE of "99" the slope is acute, and the decay is very abrupt.
Finally, set the RATE at a value of "70".



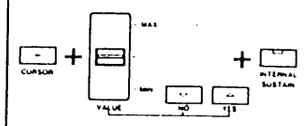


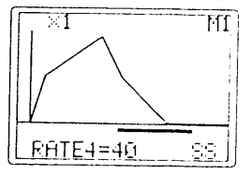
14. Move to the LEVEL parameter for step 3 with the cursor. Raise the LEVEL of approximately "50".





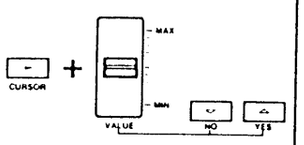
15. Next, move to the RATE parameter for step 4 with the cursor. Set the RATE to a value of "40" and enter an SS point by pressing the INTERNAL/SUSTAIN key.

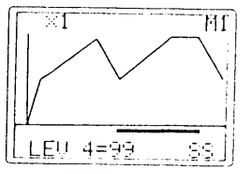




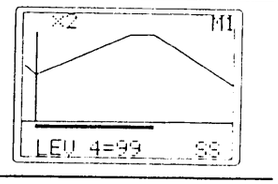
16. Move to the LEVEL parameter for step 4 with the cursor. Raise the LEVEL of approximately "99".

Notice the relationship between changes in sound and changes in the envelope on the display.





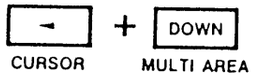
17. At this point, try taking a "wide-angle" look at the envelope you're creating by using the graphic display "ZOOM" function.

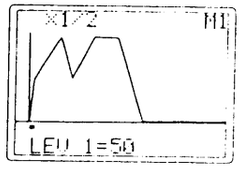


Move the cursor back to the LEVEL 1 position and press the left MULTI AREA key repeatedly to get a wide-angle view of the full envelope (up to about "× 1/2").

Notice that - depending on the ZOOM power, the display automatically "scrolls" to the right to show the next step as you edit. You can scroll manually back and forth between display pages with the cursor keys.

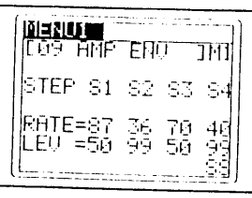
Now, hold down a key on the keyboard for a few moments and how the amplitude contour changes - just like the contour shown on the graphic display. The volume quick rises to its maximum level, gradually drops, gradually rises again and is sustained at its maximum level until you release the key - at which point the volume immediately falls to zero.





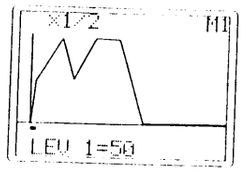
For a moment, exit into the "digital" editing mode by pressing the DISPLAY key. Study the RATE and LEVEL values and look again at the graphic display - notice the relationship between the RATE, LEVEL and STEPs? (If you want to see STEPs 5-8, use the MULTI AREA keys.)

DISPLAY



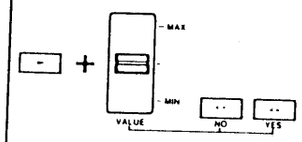
Return to graphic editing by pressing the DISPLAY key again. Notice that when you return to graphic editing that the ZOOM function is automatically set at "× 1".

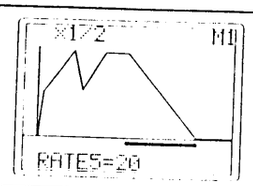
DISPLAY
+
DOWN UP
MULTI AREA
PAGE/ZOOM



18. Next, try "zooming in" on any step in the envelope with the right MULTI AREA (zoom) key. Try zooming in and out by using both MULTI AREA keys. Note how you can benefit from getting "close-up" or "wide-angle" views of the envelope. Finally, set the zoom ratio at "× 1/2".

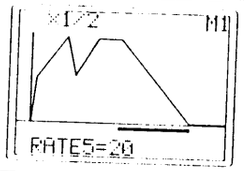
19. Next, move to the RATE parameter for step 5 with the cursor. Set the RATE at a low value - "20" or so.





20. Move to the LEVEL parameter for step 5 with the cursor. Leave the LEVEL at its minimum value - "00."

CURSOR

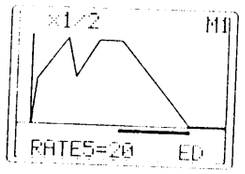


Next, set the ED (end) point in step 5 by pressing the CARD/END key.

Try holding a key down for a few moments - long enough to let the volume rise, fall, and rise again to its full sustain level ("99"). Now release the key. Notice that the sound decays slowly - just like the graphic envelope. But if you release the key before sound has reached its sustain point in the envelope, it will immediately fall off.

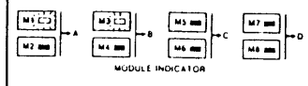
Try experimenting - move the sustain point to different positions in the envelope, alter various values, or insert an end point. Take note of how the graphic envelope - and sound - changes.

CARD
END



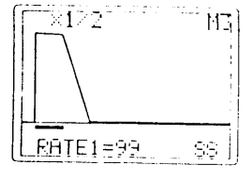
21. Now try turning on Module 3 (M3) by pressing the corresponding MODULE ON/OFF key.

K S
C
M3



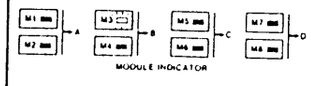
Hold down a note for a few moments and listen to the difference in amplitude contour between these two modules. To see the difference graphically, toggle between each module's envelope by pressing the corresponding MODULE SELECT keys.

9
3
M3



Also, try turning OFF M1 (press the M1 MODULE ON/OFF key) and turning M3 on by itself. Look at its envelope graphically - you can "see" how the sound immediately rises to the sustain point, and falls off as soon as you release the key.

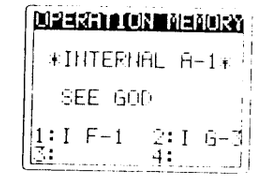
I Q
A
M1



22. For this example, assume that you've now finished editing and you want to move immediately to performance in the OPERATION MEMORY mode.
To do so, simply press the **OPERATION MEMORY** key.

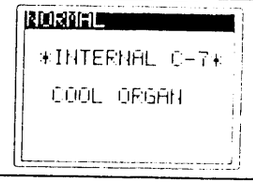
To exit to another mode, simply press the MODE key. To exit to another MENU, first press the **DISPLAY** *key to return to normal digital editing and then press the MENU key.*

OPERATION MEMORY



23. Now assume that you want to go back and edit this same function again (for some reason). To do so, simply press the NORMAL key followed by the MENU 1 key. At that time, the indicator of the COMPARE/RECALL is turned on.

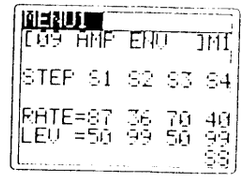
NORMAL



The last selected FUNCTION in every menu is held in memory and instantly recalled - note that 09 (AMP ENV) is recalled as soon as you press the MENU 1 key.

To edit graphically again, simply press the DISPLAY key, and you're back in business!

MENU 1

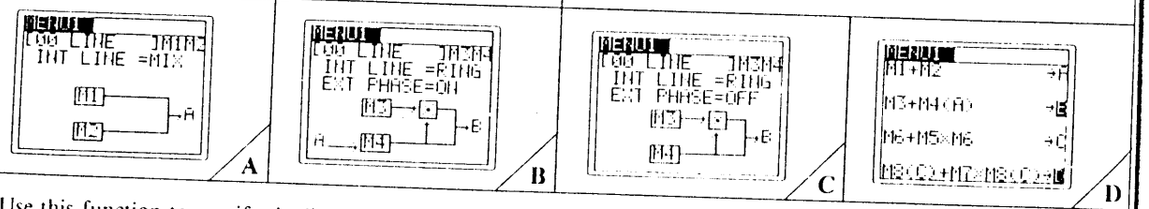


If all this seems too complex, try reading the "VZ-1 Sound Seminar" on page 92 - then try these exercises again. Once you've got a clear understanding of "envelopes," you'll be able to shape changes in sound amplitude, pitch and timbre quickly and easily, using the VZ-1's graphic editing capabilities.

After edited, if you want to LOAD your sounds to any BANKS, see "Performance/Editing in the Normal Mode" on page 79.

00 LINE

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
INT LINE = MIX / RING / PHASE EXT PHASE = ON / OFF	Pages	1 — Graphic Editing — NO
	Domain	Setting for each LINE
	Related Functions	



Use this function to specify the line configuration for all four Internal Lines, as well as External Phase relationships. The INT LINE parameter lets you choose from MIX, RING, or PHASE settings, which determines how the waveforms produced by each module are output. Note that a diagram on the display shows the internal line configuration in modular form (FIG-A).

When you want to view the line configuration of any line, press a module selector of either module in the particular line you want to view (for example, to view LINE B modules, press either the M3 or M4 selector).

In addition, this function features a "toggle" which lets you turn the EXTERNAL PHASE function ON or OFF for modules M3-M8.

When EXTERNAL PHASE is ON, the second module in the specified LINE is modulated by the previous LINE (FIG-B & FIG-C).

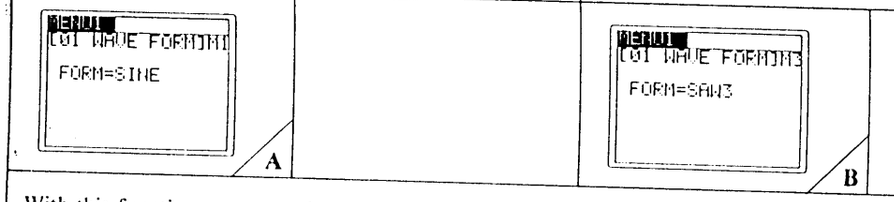
To view the overall line configuration, hold down the LINE key. As shown in FIG-D, lines used as EXT PHASE are shown in parentheses. For example, notice that "A" is used as the EXT PHASE of line "B".

Note that for advanced editing, you can toggle between MENU 1-00 and MENU 1-09 when the cursor is in the FUNCTION NUMBER position (function number flashing) of either function.
(For more information on the VZ-1's modular sound source system, refer to "VZ-1 Theory: iPD Modular Sound System" on page 12.)

Note that when this function is initialized (see page 90), data for all 8 modules are reset to factory settings (mixed internal line).

01 WAVEFORM

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
FORM = SINE / SAW1 / SAW2 / SAW3 / SAW4 / SAW5 / NOISE1 / NOISE2	Pages	1 — Graphic Editing — NO
	Domain	MODULAR
	Related Functions	



With this function, you can choose the basic waveforms which are produced by each module. Waveforms determine the basic timbre — one of the three basic elements of any sound (pitch, timbre and volume). The VZ-1 lets you choose from 8 basic waveforms. (See information below for details on various types of waveforms.)
Note that waveforms can be selected for each module independently.

COPY/INITIALIZE
This function features COPY and INTIIALIZE functions which allow you to "copy" waveform specifications from one module to another, and to "initialize" the selected module to a SINE wave.

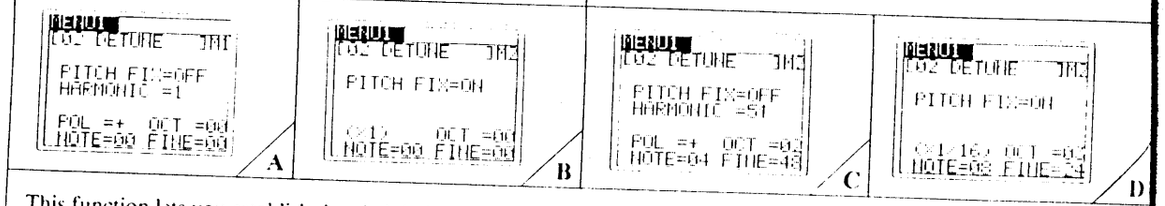
To COPY the waveform of the selected module to another module, first select MENU 1-01 and the module containing the waveform you want to copy from. Next, hold down the WRITE key and then press the MODULE SELECT key corresponding to the module you want to copy into.

To INTIALIZE the selected module, first select MENU 1-01 and the module containing the waveform you want to initialize. Next, hold down the WRITE key and then press the YES key. A SINE wave (initialized setting) will be selected for the FORM parameter.

About Waveforms
The VZ-1 lets you choose from 8 different waveforms.
These waveforms have the following types of characteristics.
Sine – the purest waveform possible with only the fundamental frequency and no other harmonics present. A "pure" whistling type of sound.
Saw 1 – A "buzzing" type of waveform with harmonics present from the fundamental on higher in decreasing amplitude. (Saw 1 has the least amount of uppr harmonics and Saw 5 has the most.)
Noise 1– A waveform consisting of all harmonics present, producing a non-pitched type of sound resembling static.
Noise 2 –Anothr noise waveform which does have the fundamntal pitch present along with the "static".

02 DETUNE

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
PITCH FIX = ON / OFF HARMONIC = 1 / 63 ~ 63 POLARITY = + / − OCT = 0 ~ 5 NOTE = 00 ~ 11 FINE = 00 ~ 63 RANGE = × 1 / × 1/16	Pages	1 — Graphic Editing — NO
	Domain	MODULAR
	Related Functions	



This function lets you establish the pitch independently for each module. By detuning some modules, you can create a "thick" sound, or emphasize certain "harmonic", etc.

The PITCH FIX parameter can also be set in this function. This lets you simulate the "attack" sound of certain instruments, by fixing the frequency of one module so that the same pitch is produced by every key on the keyboard. Note that when the PITCH FIX function is set to ON, a different set of parameters appears in the display (FIG-B).

Parameters with PITCH FIX set to OFF (normal detuning)

HARMONIC: Used to set the harmonic level at which the detuned module will sound in comparison with the standard frequency. When the harmonic level is set, other parameters are adjusted to appropriate corresponding levels automatically. At a value of "1," the standard frequency is specified and no detuning is effected.

POLARITY (POL): Used to specify whether the module will be tuned above (+) or below (−) the standard frequency.

OCTAVE (OCT): Used to raise pitch in 1-octave increments.

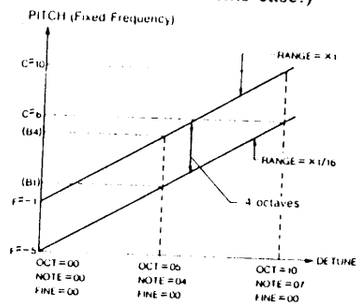
NOTE (NOTE): Used to raise or lower fixed pitch in half-tone (100-cent) increments.

FINE TUNING (FINE): Used to alter pitch in 1.6-cent increments (approximate).

When detuning is effected with the NOTE and FINE parameters, the resulting harmonic will not be an "exact" harmonic of the standard frequency. Because of this, "↑" and "↓" marks to the right of the HARMONIC indicate that the harmonic is slightly higher or lower than the displayed harmonic value (differs with detuning). (FIG-C)

Parameters with PITCH FIX set to ON

RANGE (×1 or 1/16): When set to "×1" (FIG-B), the "octave range" of the fixed-pitch sound will correspond to the keyboard pitch (and OCTAVE parameter setting), within a range of approximately F # -1 to C # 10. By selecting the "×1/16" parameter (FIG-C), the fixed-pitch sound will be shifted to a range is equal to F # -5 to approximately C # 6. (In some cases, the sound will not be audible, as it's frequency is too low for the human ear. Try raising the OCT value in this case.)



OCTAVE (OCT): Used to raise pitch in 1-octave increments.

NOTE (NOTE): Used to raise or lower fixed pitch in half-tone (100-cent) increments. (When OCT is set to "10," this range is limited to between "00" and "07.")

FINE TUNING (FINE): Used to alter pitch in 1.6-cent increments.

COPY/INITIALIZE

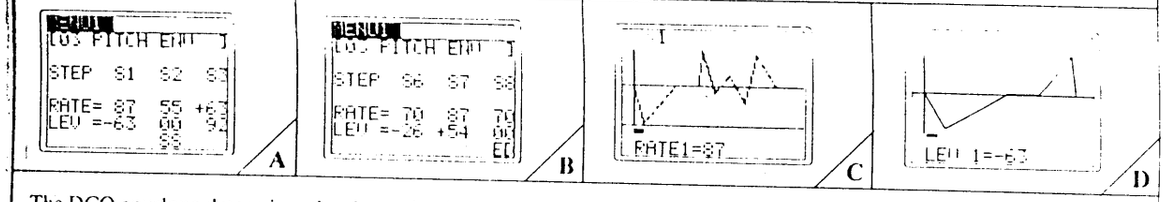
This function features COPY and INITIALIZE functions which allow you to "copy" detune specifications from one module to another, and to "reset" the selected module to an initialized setting (DETUNE OFF).

To COPY the detuning specifications of the selected module to another module, first select MENU 1-02 and the module containing the detune settings you want to copy from. Next, hold down the WRITE key and then press the MODULE SELECT key corresponding to the module you want to copy into.

To INITIALIZE the selected module, first select MENU 1-02 and the module containing the detuning specifications you want to initialize. Next, hold down the WRITE key and then press the YES key. Detuning settings will be reset to initialized values (DETUNE OFF).

03 ENVELOPE (DCO)

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
STEP = S1 ~ S8 RATE = 0 ~ 99 (STEP = S1 ~ S8) LEV = −63 ~ 63 (STEP = S1 ~ S8) SS = SUSTAIN STEP (INTERNAL key) ED = END (CARD key)	Pages	3 — Graphic Editing — YES
	Domain	GLOBAL
	Related Functions	⟨MENU 1-04⟩ ⟨MENU 1-05⟩



The DCO envelope determines the change in pitch over time for all 8 modules. The VZ-1 features 8-step envelopes, which means that RATEs and LEVELs can be set at up to 8 points in the envelope. (See "Rates and Levels" on page 97 for details.)

A level value of 00 indicates no change in pitch. (standard pitch played on keyboard). This means that positive values cause the pitch to rise, while negative values lower the pitch.

SS & ED POINTS

In addition to RATE and LEVEL values, SS (Sustain, FIG-A) and ED (End, FIG-B) points can be specified at any step in the DCO envelope.

•To enter an SS point in any step, simply press the INTERNAL/SUSTAIN key when the cursor is in either the RATE or LEVEL position of the specified step.

When a sustain point is inserted in the envelope, the PITCH will be sustained until a NOTE OFF message is received (when you release a key on the keyboard). The step immediately following the SS step then becomes the "release" point (as in ADSR type pitch envelopes).

•To delete a sustain point, move the cursor to the corresponding step and press the INTERNAL/SUSTAIN key once again.

•To enter an ED point in any step, simply press the CARD/END key when the cursor is in either the RATE or LEVEL position of the specified step.

As there are up to 8 steps in the DCO envelope, the end point is initially set in step 8. The end point can be moved to any step, however subsequent steps will automatically be deleted.

Note that ED points can be set for any step, regardless of its LEVEL value.

•To delete the end point from any step (1 through 7), simply move the cursor to the step and press the CARD/END key once again. The end point returns to step 8 automatically.

Note that the actual change affected by the level parameter depends on the setting of the envelope depth in MENU 1-04. When this depth is at its maximum, a value of −63 to +63 represents more than a 5-octave change in pitch (up or down).

Note that when this function is initialized, enabled steps in MENU 1-17 are also initialized (see page 90).

GRAPHIC DISPLAY

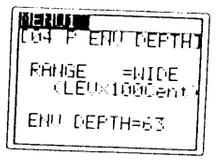
This function also contains graphic display capability that allows you to edit the DCO envelope while actually viewing it "graphically." (For further information on Graphic Display operation, see page 25.)

INITIALIZE

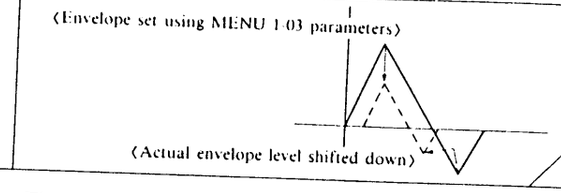
To INITIALIZE the patch first select MENU 1-03 and the module containing the specifications you want to initialize. Next, hold down the WRITE key and then press the YES key.

04 ENVELOPE DEPTH (DCO)

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE		
RANGE = WIDE/NARROW ENV DEPTH = 00 ~ 63	Pages	1	Graphic Editing	NO
	Domain	GLOBAL		
	Related Functions	⟨MENU 1-03⟩ ⟨MENU 1-05⟩		



A



B

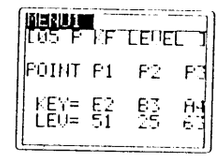
This function contains two parameters — RANGE and DEPTH. Both of these parameters affect the DCO ENVELOPE settings which are specified in function 03 (MENU 1-03).

The RANGE parameter is a toggle which can be set to either WIDE or NARROW. When WIDE is selected, units used in setting the ENVELOPE LEVEL in MENU 1-03 are equal to 100 cents and the maximum setting range is + / − 5 octaves. When NARROW is selected, LEVEL is changed in 25-cent increments, and the maximum setting range is decreased to approximately more than + / − 1 octave.

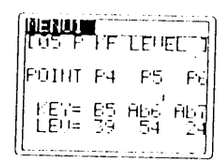
The ENVELOPE DEPTH parameter can be used to "shift" the level of the entire envelope produced using the DCO ENVELOPE parameters (03). At a value of "63", the envelope is produced as set in MENU 1-03. And at a value of "00", the pitch is not changed by DCO ENVELOPE set in MENU 1-03.

05 KF LEVEL (DCO)

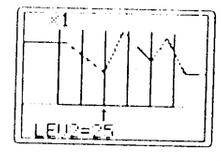
Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE		
POINT = P1 ~ P6 KEY = C0 ~ C9 LEV = 00 ~ 63	Pages	2	Graphic Editing	YES
	Domain	GLOBAL		
	Related Functions	⟨MENU 1-16⟩ ⟨MENU 1-03⟩ ⟨MENU 1-04⟩		



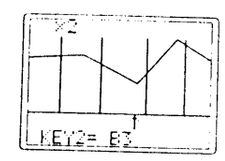
A



B



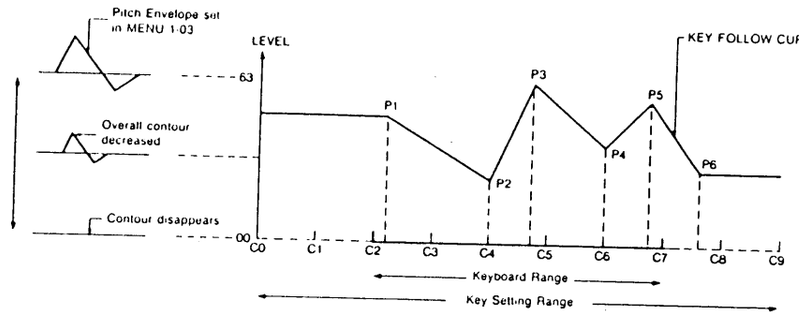
C



D

The parameters in this function are used to determine how Keyboard Follow (KF) affects the DCO envelope (pitch) produced using the parameters in MENU 1-03 and MENU 1-04. The VZ-1 features 6-step keyboard follow, which means that LEVELs can be set at 6 points in the KEYBOARD FOLLOW CURVE.

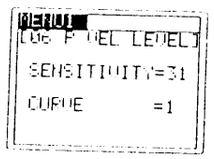
The key parameter represents positions on the keyboard, with A4 being the central position. In this state, each "POINT" in the KF curve can be moved in harf-tone increments. As the "LEVEL" parameter value is increased, the contour of the curve is increased, while it is decreased as the value is decreased.



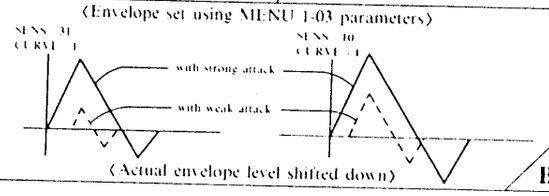
POINT	P1	P2	P3	P4	P5	P6
KEY	E2	C4	A4	C6	A♭6	F♯7
LEVEL	50	25	63	35	57	28

06 VELOCITY LEVEL (DCO)

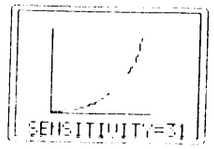
Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
SENSITIVITY = 00 ~ 31 CURVE = 1 ~ 8	Pages	1 — Graphic Editing — YES
	Domain	GLOBAL
	Related Functions	⟨MENU 1-03⟩ ⟨MENU 1-04⟩ ⟨MENU 1-05⟩



A



B



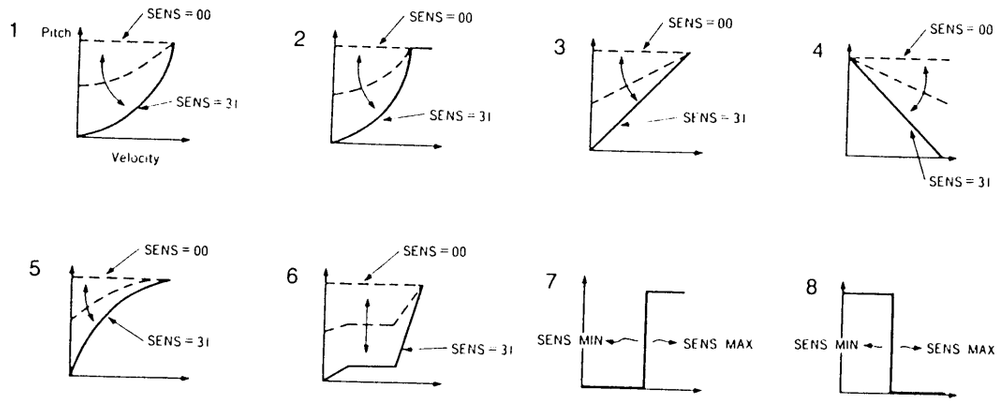
C

This function features 2 basic parameters which are used to contour the VZ-1's key-touch control over the DCO (pitch) envelope's level for all modules (M1 ~ M8). In other words, these settings — SENSITIVITY and CURVE — determine how responsive all 8 modules will be to key touch dynamics with regards to changes in pitch.

The CURVE parameter lets you choose from any of 8 different velocity curves, which determine the contour of velocity control over time. The SENSITIVITY parameter lets you set the range of change in the DCO ENVELOPE by velocity control. At a setting of "00", the selected module will be totally unresponsive to velocity control — in other words, your keyboard attack will have no effect over changes in pitch. A setting of "31" indicates maximum sensitivity. (FIG-B)

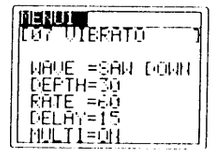
The CURVE parameter is used to select one of the 8 velocity curves (contours) as shown in the figures below. These curves determine how the pitch actually changes over time. The graphic of the VELOCITY CURVE is not changed by the level of SENSITIVITY parameter. (FIG-C)

[CURVES]

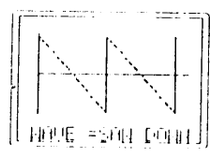


07 VIBRATO (DCO)

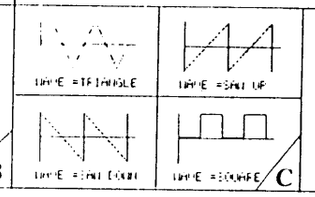
Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
WAVE = TRIANGLE/SAW UP/ SAW DOWN/SQUARE DEPTH = 00 ~ 99 RATE = 00 ~ 99 DELAY = 00 ~ 99 MULTI = ON/OFF	Pages	1 — Graphic Editing — YES
	Domain	GLOBAL
	Related Functions	⟨MENU 2-15⟩



A



B



C

The VIBRATO function corresponds to the LFO of an analog synthesizer. It oscillates the low frequencies of the DCO, and this oscillation adds a "vibrato" effect to the selected waveform. There are five basic parameters within this function — WAVE, DEPTH, RATE, DELAY and MULTI.

The WAVE parameter lets you choose the basic waveform of the vibrato oscillation. There are 4 — SQUARE, SAW DOWN, SAW UP, and TRIANGLE. (FIG-C) (See information below for details on various types of waveforms which can be selected.)

You can use the DEPTH parameter to set the "depth" of vibrato oscillation (how strong the vibrato is). The larger the value, the deeper the vibrato effect. (If this is set to "00", no vibrato will be generated. Be sure to raise the value before altering other settings.)

The RATE parameter is used to set the "speed" of vibrato oscillation. The higher the value, the faster the vibrato effect.

The DELAY parameter is used to set the period of time from initial key depression until the point where vibrato oscillation begins. The larger the value, the longer the delay before vibrato is applied.

The MULTI parameter features a toggle which can be set to either ON or OFF. When MULTI is set to ON, the vibrato effect is engaged independently as keys are played, so that each note's vibrato is independent (not synchronized with vibrato delay and oscillation of keys played previously or subsequently). This effect is useful in creating "ensemble" sounds.

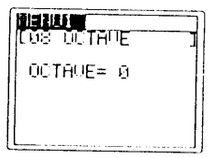
When this parameter is set to OFF, vibrato oscillation is synched for all keys, regardless of when they are played (in unison or independently).

[WAVEFORMS]

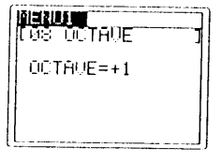
Triangle – produces a smooth repeating up and down pitch variation.
Saw Up – produces a repeating pitch rise starting from the fundamental frequency.
Saw Down – produces a repeating pitch "swoop" down from above to the fundamental frequency.
Square – produces a repeating "trill" between the original pitch and a higher pitch.

08 OCTAVE

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE		
OCTAVE = −2/−1/0/1/2	Pages	1	Graphic Editing	NO
	Domain	GLOBAL		
	Related Functions			



A

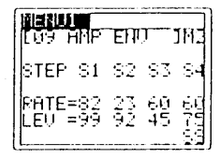


B

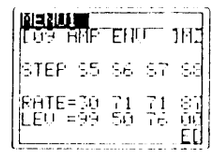
This function features only one parameter — OCTAVE, which is used to raise or lower the overall octave of all 8 modules (M1 ~ M8) globally. At a value of "0", the octave for all 8 modules is set at the standard pitch level (A4 = 442Hz). (This is assuming that "Detune" is set to "Harmonic 1" for the module in question. . . . .). You can raise or lower the octave by a maximum of 2 octaves, in 1-octave increments.

09 ENVELOPE (DCA)

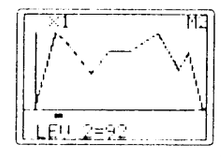
Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE		
STEP = S1 ~ S8 RATE = 00 ~ 99 LEV = 00 ~ 99 SS = SUSTAIN STEP (INTERNAL key) ED = END (CARD key)	Pages	2	Graphic Editing	YES
	Domain	MODULAR		
	Related Functions 〈MENU 1-10〉 〈MENU 1-11〉			



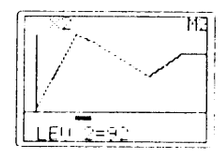
A



B



C



D

This function basically contains 8 "STEPs", each of which is broken down into RATEs and LEVELs which you can use to create 8-step (maximum) amplitude envelopes for each module (M1 ~ M8).

These DCA "envelopes" determine how the amplitude (remember, amplitude = loudness) of each module changes over time. In other words, the sound attack and decay, and all the changes in volume which the sound goes through in between.
Furthermore, as mentioned in the section on the iPD Sound Source on Page 12, if the module LINE is set to EXT PHASE for the next LINE, ENVELOPE DCA affects the timbre of the succeeding LINE.

(For more information on ENVELOPEs, RATEs, LEVELs and STEPs, refer to the VZ-1 Sound Seminar on page 92.)

SS & ED POINTS
In addition to RATE and LEVEL values, SS (Sustain, FIG-A) and ED (End, FIG-B) points can be specified at any step in the DCA envelope.

- To enter an SS point in any step, simply press the INTERNAL/SUSTAIN key when the cursor is in either the RATE or LEVEL position of the specified step.

When a sustain point is inserted in the envelope, the sound will be sustained until a NOTE OFF message is received (when you release a key on the keyboard). The step immediately following the SS step then becomes the "release" point (as in ADSR type amplitude envelopes).

- To delete a sustain point, move the cursor to the corresponding step and press the INTERNAL/SUSTAIN key once again.

- To enter an ED point in any step, simply press the CARD/END key when the cursor is in either the RATE or LEVEL position of the specified step.
  As there are up to 8 steps in the DCA envelope, the end point is initially set in step 8. The end point can be moved to any step, however subsequent steps will automatically be deleted.

To delete the end point from any step (1 through 7), simply move the cursor to the step and press the CARD/END key once again. The end point returns to step 8 automatically.

Note that for advanced editing, you can toggle by using cursor key between MENU 1-00 and MENU 1-09 when the cursor is in the FUNCTION NUMBER position (function number flashing) of either function (► = 00 → 09 ◄ = 09 → 00).

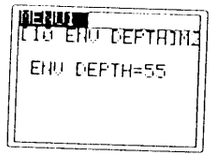
GRAPHIC DISPLAY
This function also contains graphic display capability that allows you to edit the DCA envelope while actually viewing it "graphically." This function works in exactly the same way as the DCO envelope graphic display (see page 36). (For further information on Graphic Display operation, see page 25.)

COPY/INITIALIZE
This function features COPY and INTIALIZE functions which allow you to "copy" DCA specifications from one module to another, and to "reset" the selected module to an initialized setting.
To COPY the DCA specifications of the selected module to another module, first select MENU 1-09 and the module containing the detune settings you want to copy from. Next, hold down the WRITE key and then press the MODULE SELECT key corresponding to the module you want to copy into. When this procedure is carried out, complete DCA data (MENU 1-10, 11, 12, 14, 17) is copied into the destination module.
To INTIALIZE the selected module, first select MENU 1-09 and the module containing the specifications you want to initialize. Next, hold down the WRITE key and then press the YES key. DCA settings for MENU 1-09 and MENU 1-17 (VEL RATE) will be reset to initialized values.

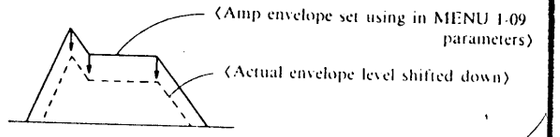
Note that when this function is initialized the AMP ENVELOPE of the selected module, as well as enabled steps in the AMP ENV of MENU 1-17 are initialized (see page 90).

10 ENV DEPTH (DCA)

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
ENV DEPTH = 00 ~ 99	Pages	1
	Graphic Editing	NO
	Domain	MODULAR
	Related Functions	⟨MENU 1-09⟩ ⟨MENU 1-11⟩



A

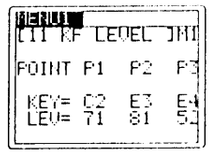


B

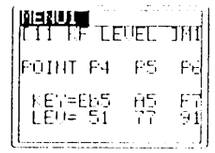
This function lets you raise or lower the entire contour of the DCA envelopes for all 8 modules, created using MENU 1-09 (DCA Envelope). Note that this function has no direct effect on the actual envelope, but simply raises or lowers its overall "level". Simply speaking, the overall volume level of the selected module is decreased as you lower the ENV DEPTH level. Settings can be made for all 8 modules independently.

11 KF LEVEL (DCA)

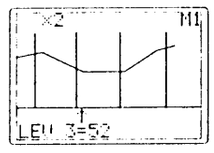
Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
POINT = 1 ~ 6 KEY = C0 ~ C9 LEV = 00 ~ 99	Pages	2
	Graphic Editing	YES
	Domain	MODULAR
	Related Functions	⟨MENU 1-09⟩ ⟨MENU 1-10⟩



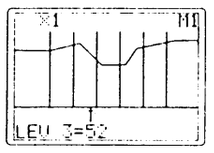
A



B



C



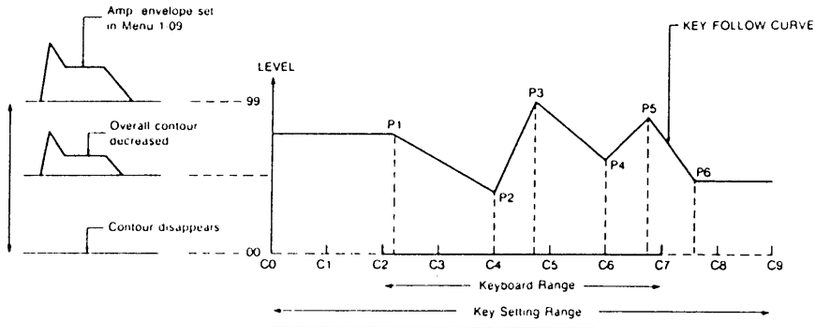
D

The parameters in this function are used to determine how Keyboard Follow (KF) affects the DCA envelope (loudness) produced using the parameters in MENU 1-09 and MENU 1-10. The VZ-1 features 6-step keyboard follow, which means that LEVELs can be set at 6 points in the KEYBOARD FOLLOW CURVE.

The settings for this function are made in exactly the same way is in the DCO (pitch) KF LEVEL function (MENU 1-05). But, DCA KF LEVEL can be set for each MODULE independently. (See page 38.)

GRAPHIC DISPLAY

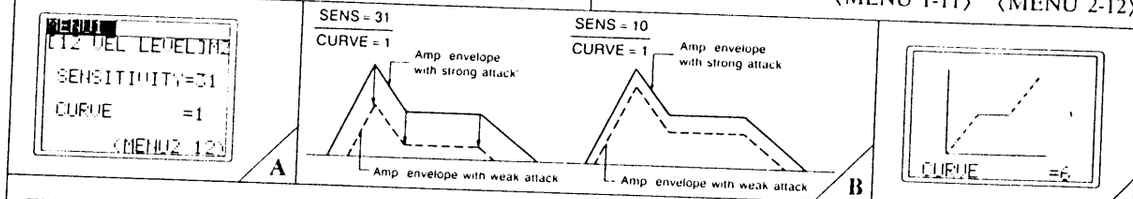
This function also contains graphic display capability that allows you to edit the KEY FOLLOW CURVE while actually viewing it "graphically." (For further information on Graphic Display operation, see page 25.)



POINT	P1	P2	P3	P4	P5	P6
KEY	E2	C4	A4	C6	A♭6	F♯7
LEVEL	79	40	99	56	90	44

12 VELOCITY LEVEL (DCA)

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
SENSITIVITY = 00 ~ 31 CURVE = 1 ~ 8	Pages	1 — Graphic Editing — YES
	Domain	MODULAR
	Related Functions	⟨MENU 1-09⟩ ⟨MENU 1-10⟩ ⟨MENU 1-11⟩ ⟨MENU 2-12⟩



This function features 2 basic parameters which are used to contour the VZ-1's key-touch control over the DCA (amplifier) envelope's level, for each module (M1 ~ M8). In other words, these settings — SENSITIVITY and CURVE — determine how responsive the waveform produced by any given module will be to key touch dynamics.

The CURVE parameter lets you choose from any of 8 different velocity curves, which determine the contour of velocity control over time. The SENSITIVITY parameter lets you select values between "00" and "31". However, when viewed graphically, the SENSITIVITY setting has no effect on the displayed CURVE. At a setting of "00", the selected module will be totally unresponsive to velocity control — in other words, your keyboard attack will have no effect over loudness. A setting of "31" indicates maximum sensitivity.

The CURVE parameter is used to select one of the 8 velocity curves (contours) as shown in the figures below. These curves determine how the amplitude actually changes with key velocity.

Notice that if you choose — for example — curve 7 for one module and curve 8 for another, each will sound quite differently according to the velocity at which you play the keyboard.

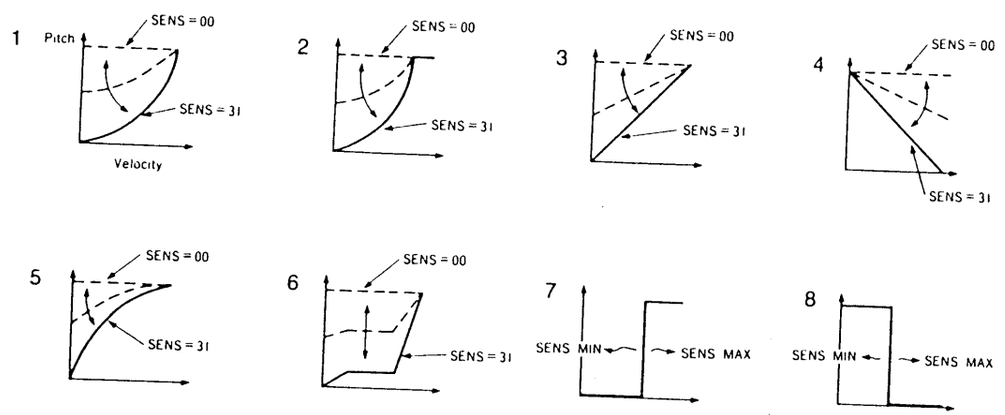
Note that the degree of this effect is dependent on settings mode in MENU 1-10 (Amp. ENV.) as well as in MENU 1-11 (KF. ENV.)

GRAPHIC DISPLAY

This function also contains graphic display capability that allows you to edit VELOCITY CURVEs while actually viewing them "graphically."

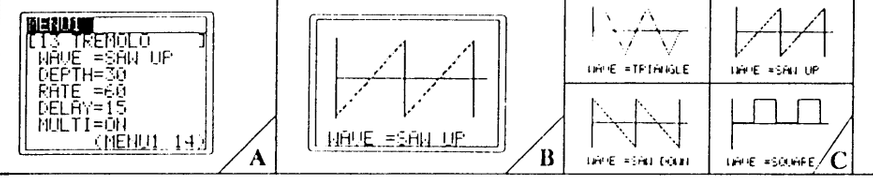
•Note that if VEL INVERSE (MENU 2-12) is set to ON, the display curve will also be "inversed." (FIG-D)

[CURVES]



13 TREMOLO

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
WAVE = TRIANGLE/SAW UP/ SAW DOWN/SQUARE DEPTH = 00 ~ 99 RATE = 00 ~ 99 DELAY = 00 ~ 99 MULTI = ON/OFF	Pages	1 — Graphic Editing — YES
	Domain	GLOBAL
	Related Functions	⟨MENU 1-14⟩



Tremolo is a form of low-frequency oscillation which affects the DCA to produce cyclical changes in volume characteristics. The parameters in this function are used to create a "tremolo" effect globally. Note, however, that settings for parameters in MENU 1-14 (AMP SENS) can be made independently for each module. This allows you to control the depth of each module independently, while settings in the TREMOLO function (MENU 1-13) are used to create and control the "actual" tremolo oscillation.

The WAVE parameter lets you choose the basic waveform of the tremolo oscillation. There are 4 — SQUARE, SAW DOWN, SAW UP, and TRIANGLE. (See information below for details on how various types of waveforms affect volume changes.)

You can use the DEPTH parameter to set the "depth" of tremolo oscillation (how strong the tremolo is). The larger the value, the deeper the tremolo effect. (If this parameter is set to "00", no tremolo will be generated. Be sure to raise this level before altering other parameter settings.)

The RATE parameter is used to set the "speed" of tremolo oscillation. The higher the value, the faster the tremolo effect.

The DELAY parameter is used to set the period of time from initial key depression until the point where tremolo oscillation begins. The larger the value, the longer the delay before tremolo is applied.

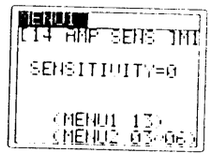
The MULTI parameter features a toggle which can be set to either ON or OFF. When MULTI is set to ON, the tremolo effect is engaged independently as keys are played, so that each note's tremolo is independent (not synchronized with tremolo delay and oscillation of keys played previously or subsequently). When this parameter is set to OFF, tremolo oscillation is synched for all keys, regardless of when they are played (in unison or independently).

[WAVEFORMS]

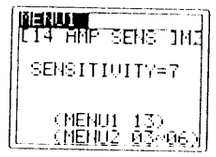
Triangle – produces a smooth "pulsating" volume shift.
Saw Up – produces a repeating rise and then cutoff in volume.
Saw Down – produces a repeating "swoop" down in volume.
Square – produces an "on and off" volume characteristic.

14 AMP SENSITIVITY

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
SENSITIVITY = 0 ~ 7	Pages	1 — Graphic Editing — NO
	Domain	MODULAR
	Related Functions	⟨MENU 1-13⟩ ⟨MENU 2-03 ~ 06⟩



A



B

This function features only one parameter, SENSITIVITY, which is set independently for each module. This "sensitivity" level determines how "sensitive" each module is to the effects listed below. (Or, in simpler terms, SENSITIVITY determines the degree of "depth" or "strength" the effects have in the specified module.)

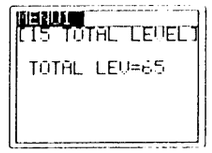
When SENSITIVITY is set to a value of "0", the all effects listed below will not affect the specified module's sound. At a value of "7", the effects will be strongest.

⟨Related Functions⟩

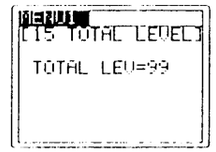
MENU 1-13 TREMOLO DEPTH
MENU 2-03 TREMOLO DEPTH (After Touch)
MENU 2-04 TREMOLO DEPTH (Definable Wheel 1)
MENU 2-05 TREMOLO DEPTH (Definable Wheel 2)
MENU 2-06 TREMOLO DEPTH (Foot VR)
MENU 2-03 DCA ENV BIAS (After Touch)
MENU 2-04 DCA ENV BIAS (Definable Wheel 1)
MENU 2-05 DCA ENV BIAS (Definable Wheel 2)
MENU 2-06 DCA ENV BIAS (Foot VR)

15 TOTAL LEVEL

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
TOTAL LEV = 00 ~ 99	Pages	1 — Graphic Editing — NO
	Domain	GLOBAL
	Related Functions	⟨MENU 2-07⟩



A



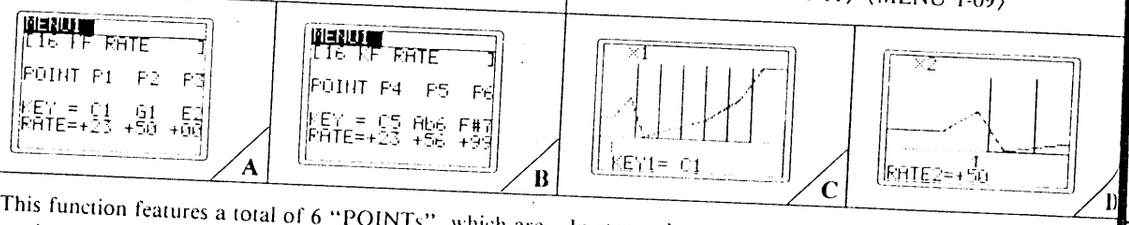
B

This function features only one parameter, TOTAL LEV, which is used to control the overall amplitude (volume) level of the VZ-1 (for all modules, M1 ~ M8).

This parameter acts as a "governer", controlling the maximum possible volume level which can be attained with the volume control. With a value of "00", no sound is output — even when the volume slider is set to MAX. The maximum amplitude level can be selected by inputting a level of "99".

16 KF RATE (DCO/DCA)

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE
POINT = P1 ~ P6 KEY = C0 ~ C9 RATE = 00 ~ 99	Pages	1 — Graphic Editing — YES
	Domain	GLOBAL
	Related Functions	⟨MENU 1-05⟩ ⟨MENU 1-03⟩ ⟨MENU 1-11⟩ ⟨MENU 1-09⟩



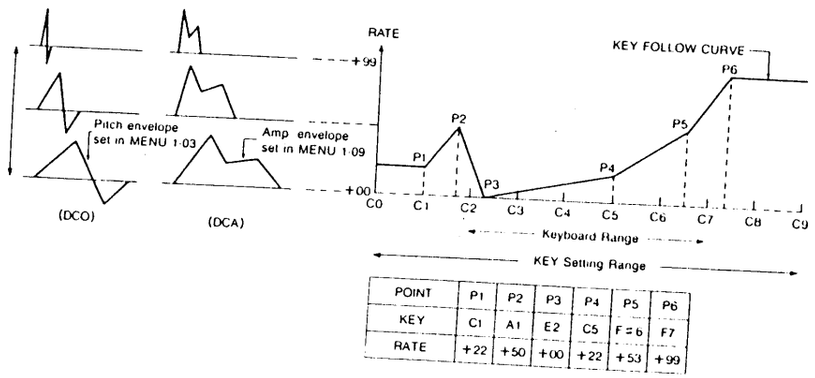
This function features a total of 6 "POINTs", which are used to create a KEY FOLLOW CURVE. This function is directly related to the KF LEVEL functions (MENU 1-05 and MENU 1-11). Notice that with the LEVEL functions, you can set specify KEYs and LEVELs for each POINT in the curve(s). The KF RATE function is used to specify the RATE (remember, rate and level together determine time) for each point in the curve.

These settings are global, affecting all DCO and DCA envelopes (MENU 1-03 and MENU 1-09).

In steps where the rate value is higher, a rapid "attack" or "decay" is effected. In a position where the rate value is low, the rate of the envelope is equal to that set in MENU 1-03 and MENU 1-09.

GRAPHIC DISPLAY

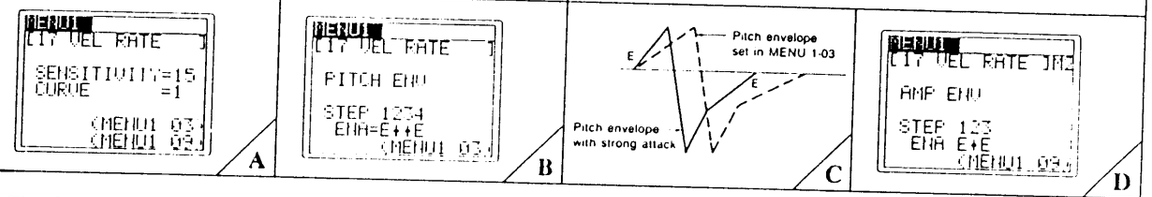
This function also contains graphic display capability that allows you to edit the KEY FOLLOW curve while actually viewing it "graphically." (For further information on Graphic Display operation, see page 25.)



POINT	P1	P2	P3	P4	P5	P6
KEY	C1	A1	E2	C5	F#6	F7
RATE	+22	+50	+00	+22	+53	+99

17 VELOCITY RATE (DCO/DCA)

Parameters	O/S	MENU 1 — VALUE — MENU 1 — VALUE — PAGE — VALUE — PAGE
⟨SENSITIVITY⟩ SENSITIVITY = 00 ~ 31 CURVE = 1 ~ 8 ⟨PITCH ENVELOPE⟩ STEP = 1 ~ 8 ENA = E/*	Pages	3 — Graphic Editing — YES
⟨AMP ENVELOPE⟩ STEP = 1 ~ 8 ENA = E/*	Domain	PITCH = GLOBAL / AMP = MODULAR
	Related Functions	⟨MENU 1-03⟩ ⟨MENU 1-09⟩



This function features parameters which are used to control velocity RATE, in correspondence with DCO and DCA envelopes created using MENU 1-03 and MENU 1-09.

While the velocity RATE setting is global (affects all 8 modules), you can choose whether RATE control is enabled or disabled for each step in both the DCO and DCA envelopes.

On display page 1, the SENSITIVITY and CURVE parameters can be selected.

When SENSITIVITY is set to a value of "00", velocity will be disabled entirely. As SENSITIVITY is raised, the envelope rate becomes more acute when the keyboard is played with a strong (fast) attack (high "velocity").

The CURVE parameter lets you choose from one of 8 different VELOCITY RATE curves, as shown below. By pressing the DISPLAY key, you can view the selected curve graphically. (However, when viewed graphically, the SENSITIVITY seting has no effect on the displayed CURVE.) The horizontal axis of the VELOCITY CURVE represents additive values to the rate parameter. As the value is increased, the rate of steps in the envelope (DCO/DCA) are increased further.

On display page 2, you can specify whether or not the VEL RATE curve will affect the individual steps of the PITCH ENV (DCO envelope) which is set using MENU 1-03. This setting is global, affecting all 8 modules (M1 ~ M8).

To ENABLE (make effective) the VEL RATE for any step in the envelope, simply move the cursor to the desired step position and press the YES key ("E" is displayed). To disable, simply press the NO key ("+" is displayed). (If you set less than 8 steps, steps following END POINT are not displayed.) If the parameter is set as in FIG-B, the envelope changes as illustrated in FIG-C, with a strong attack (The rate of steps 1 and 4 become acute).

On display page 3, you can specify whether or not the VEL RATE curve will affect the individual steps of the AMP ENV (DCA envelope) which is set using MENU 1-09. These settings can be made for each module (M1 ~ M8) individually.

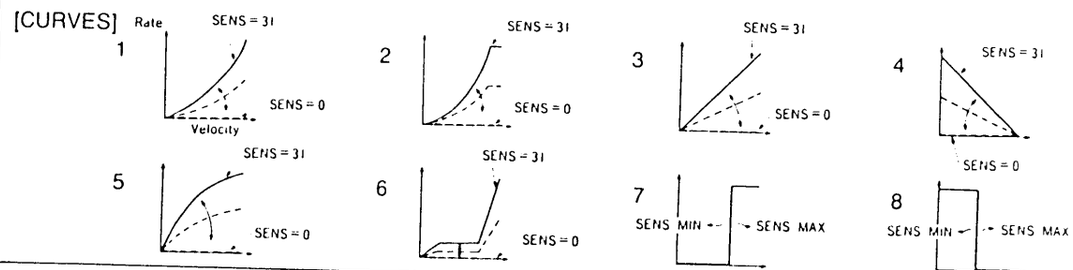
To ENABLE the VEL RATE for any step in the envelope, simply move the cursor to the desired step position and press the YES key ("E" is displayed). To disable, simply press the NO key ("+" is displayed).

GRAPHIC DISPLAY

This function also contains graphic display capability that allows you to view the CURVE parameter "graphically." For details on graphic editing, see page 25.

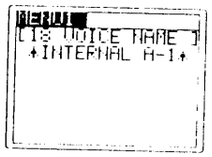
Note that parameters contained in the three display "pages" of this function can be initialized independently (page 1, page 2 and page 3). Refer to page 90 for information on initializing the VZ-1.

[CURVES]

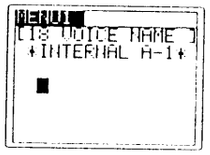


18 VOICE NAME

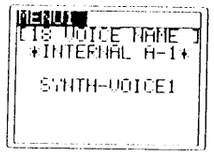
Parameters	O/S	MENU 1 — VALUE — MENU 1 — MODULE (ON/OFF or SELECT) — CURSOR
Alphabet = A ~ Z Numeral = 0 ~ 9 Marks = " . ", " – ", " / "	Pages	1 — Graphic Editing — NO
	Domain	GLOBAL
	Related Functions	



A



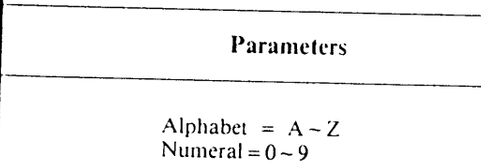
B



C

This function is used to assign a name to the "patches" created using other MENU-1 functions.

The names you choose may contain both letters and numbers, and may be up to 12 characters in length.
Character input is carried out using the MODULE ON/OFF keys, and the MODULE SELECT keys. As shown in the charts below, the same key is used to input more than one letter or number.

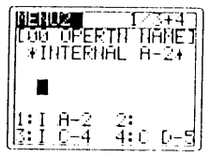


Keys \ Key Depression	×1	×2	×3
A	A	I	Q
B	B	J	R
C	C	K	S
D	D	L	T
E	E	M	U
F	F	N	V
G	G	O	W
H	H	P	X

Keys \ Key Depression	×1	×2
1	1	Y
2	2	Z
3	3	9
4	4	0
5	5	·
6	6	–
7	7	/
8	8	SPACE

00 OPERATION NAME

Parameters	O/S	MENU 2 — VALUE — MENU 2 — MODULE (ON/OFF or SELECT) — CURSOR
Alphabet = A ~ Z Numeral = 0 ~ 9 Marks = " . ", " – ", " / "	Pages	1 — Graphic Editing — NO
	Domain	OPERATION MEMORY
	Related Functions	

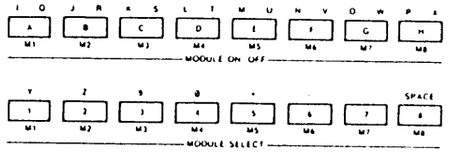


A

This function is used to assign a name to the VZ-1's Operation Memories.
The names you choose may contain both letters and numbers, and may be up to 12 characters in length.
Character input is carried out using the MODULE ON/OFF keys, and the MODULE SELECT keys. (See "Character Index", below.) The procedure is the same as for MENU 1-18 "VOICE NAME".

Note that this function can only be accessed when OPERATION MEMORY is selected.

To initialize this function (create a blank slate for name writing)hold down the WRITE key and respond to the display prompt by pressing the YES key.

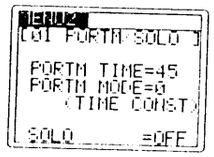


Keys \ Key Depression	×1	×2	×3
A	A	I	Q
B	B	J	R
C	C	K	S
D	D	L	T
E	E	M	U
F	F	N	V
G	G	O	W
H	H	P	X

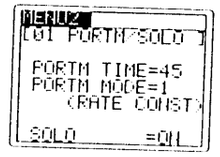
Keys \ Key Depression	×1	×2
1	1	Y
2	2	Z
3	3	9
4	4	0
5	5	·
6	6	–
7	7	/
8	8	SPACE

01 PORTAMENTO/SOLO

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
PORTM TIME = 0 ~ 99 PORTM MODE = 0 (CONSTANT TIME)/ 1 (CONSTANT RATE) SOLO = ON/OFF	Pages	1 — Graphic Editing — NO
	Domain	GLOBAL
	Related Functions	



A



B

The parameters in this function are used to establish and control built-in portamento and "solo" effects.

The portamento effect causes a smooth change in pitch between notes, resulting in a "glide" effect. It is controlled with two basic parameters — TIME and MODE.

Normally, the PORTM TIME parameter determines the "portamento time" between notes — in other words, the time that it takes the pitch to "glide" from one note to the next note played. The higher the value of this parameter, the longer the portamento time.
This parameter actually performs two different functions, depending on how the PORTM MODE parameter is set (read on!).
The PORTM MODE parameter determines whether the "constant" which portamento is based on. When this parameter is set to TIME CONST (a value of "0"), the time required for pitch to glide between notes is constant — regardless of the distance between the notes. In other words, it takes the same amount of time to glide between, for example C1 and C5 as it does to glide between C4 and D4. This is what is generally considered "normal" portamento. (FIG-A/C)

When the PORTM MODE parameter is set to RATE CONST (a value of "1"), the rate or "speed" of portamento glide becomes constant. This means that the time required for pitch to glide between notes differs with the distance between the notes, as it is "gliding" at a constant rate. (FIG-B/D)

Note that the PORTM TIME parameter determines this constant rate when RATE CONST is selected, and has no direct effect on the actual portamento time.

The SOLO parameter is a toggle which can be used to turn the solo function ON or OFF. The solo function is a "last note priority" effect. When this function is ON and more than one note is played, the system will cause the only the last one played to sound. This function is useful in playing "solo" passages, as only one note sounds at a time. Try turning on both the "solo" and portamento functions to create "mono synthesizer" or electric bass sounds.
When SOLO = ON with a PORT TIME of any value other than "00", Portamento effect can only be attained by legato performance (notes played without breaks in between).

Note that for advanced editing, you can toggle between MENU 2-01 and MENU 2-07 when the cursor is in the FUNCTION NUMBER position (function number flashing) of either function.

FIG-C

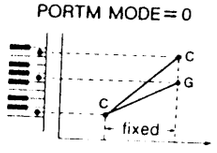
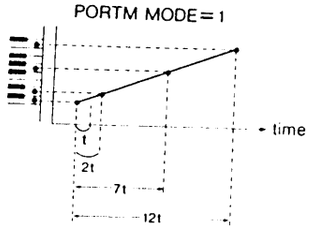


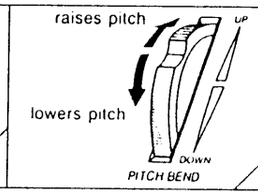
FIG-D



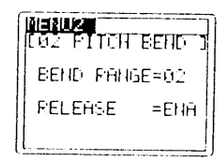
02 PITCH BEND

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
BEND RANGE = 00 ~ 48 RELEASE = ENA/DIS	Pages	1 — Graphic Editing — NO
	Domain	GLOBAL
	Related Functions	(MENU 3-05)

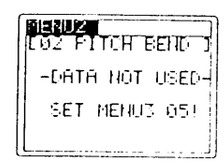
A



B



C



D

This function features two parameters — BEND RANGE and RELEASE — which are used to determine how the VZ-1 pitch bend wheel can be used to raise or lower pitch.

The BEND RANGE parameter can be used to raise or lower the maximum limit that pitch can be bended, in half-step increments. At the minimum value of "00", the pitch bend wheel has no effect on pitch, while at the maximum value of "48", you can bend notes a maximum of 48 half-steps (4 octaves), up and down.

The RELEASE parameter lets you choose whether or not the pitch bend wheel can be used to bend sounds which are sustained after the keyboard is released.

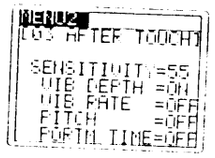
When this parameter is set to DIS (disable), you can bend notes only while actually playing them (before the release point in DCA curve). (FIG-A)

When set to ENA (enable), you can also bend any note that is still sounding (portion of sound following the release point in DCA curve) — even after releasing the corresponding key. (FIG-C)

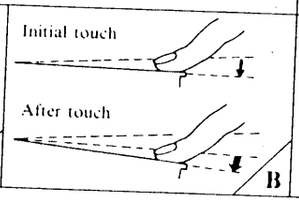
Note that if the TOTAL BEND parameter in MENU 3-05 is set to "ON," the settings made using this function will be disabled, and the display will appear as in FIG-D.

03 AFTER TOUCH

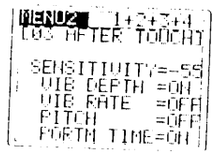
Parameters		O/S	MENU 2 — VALUE — MENU 2 — VALUE
SENSITIVITY (NORMAL, MULTI-CHANNEL) = 00 ~ 99 (COMBINATION) = – 99 ~ + 99 VIB DEPTH = ON/OFF VIB RATE = ON/OFF	PITCH = + ON/ – ON/OFF PORTM TIME = ON/OFF TREM DEPTH = ON/OFF TREM RATE = ON/OFF A ENV BIAS = ON/OFF	Pages	2
		Graphic Editing	NO
		Domain	GLOBAL
		Related Functions	(MENU 1-14)



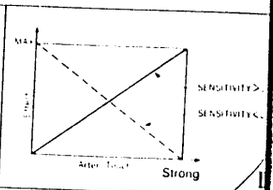
A



B



C



D

This function is used to specify the sensitivity of VZ-1 "after touch", and the effects that after touch is used to control.

When playing the keyboard, you can access the after touch function by pressing down on a keyboard key after bringing it to the end of its initial stroke (FIG-B). (Naturally, the same is true for multiple keys.)
After Touch can be used to control a variety of VZ-1 effects, such as vibrato, portamento and tremolo.

The SENSITIVITY parameter is used to determine how "sensitive" the VZ-1 keyboard is to after touch. If sensitivity is high (at a level of "99", for example), it only takes a small amount of pressure on the key to engage the effect(s) which are being controlled by after touch. At a level of "00", the after touch function is totally non-operational.
In the COMBINATION mode, you can set this parameter in a range of – 99 to + 99 (FIG-C). When negative values are input, after touch is inversed (FIG-D).

The other parameters in this function are toggles, which let you determine which effects will be controlled by after touch (and how they will be affected).
Note that these effects may already be engaged — even without using after touch. In this case, after touch can be used to make the effects "deeper" or "stronger" than the normal settings which are already engaged. For example, let's assume you have already set a VIB DEPTH value in MENU 1-07 (VIBRATO function), so vibrato is engaged in your patch. If you turn the AFTER TOUCH "VIB DEPTH" parameter ON (MENU 2-03), then the vibrato depth will be increased even further when you use after touch.

The following chart lists how after touch can be used to control various sound effect functions.

VIB DEPTH = ON/OFF
ON: Vibrato depth set in MENU 1-07 increased
OFF: After touch does not control vibrato depth

VIB RATE = ON/OFF
ON: Vibrato rate set in MENU 1-07 increased
OFF: After touch does not control vibrato rate

PITCH BEND = – ON/OFF/ + ON
– ON: Pitch bent down (max = 1 octave with sensitivity of "99")
OFF: After touch does not affect pitch
+ ON: Pitch bent up (max = 1 octave with sensitivity of "99")
•Pitch bend range does not correspond to MENU 2-01 setting.

PORTM TIME = ON/OFF
ON: PORTM time set in MENU 2-01 is increased
OFF: PORTM time is not affected by after touch

TREM DEPTH = ON/OFF
ON: Tremolo depth set in MENU 1-13 is increased
OFF: Tremolo depth is not affected by after touch

TREM RATE = ON/OFF
ON: Tremolo rate set in MENU 1-13 is increased
OFF: Tremolo rate is not affected by after touch

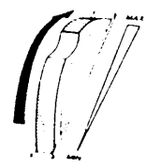
AMP ENV BIAS = ON/OFF
ON: Amplitude envelope bias increased by after touch, with max. level as set in MENU 1-09
OFF: Amplitude envelope bias is not affected by after touch

Note that TREM DEPTH, TREM RATE and AMP ENV BIAS levels can be set for each module (M1 ~ M8) independently, in MENU 1-14 (AMP SENS). Naturally, these independent settings also affect after touch characteristics for the above parameters.

04 DEF WHEEL 1

Parameters		O/S	MENU 2 — VALUE — MENU 2 — VALUE
SENSITIVITY = 00 ~ 99 VIB DEPTH = ON/OFF VIB RATE = ON/OFF PITCH = + ON/ – ON/OFF	PORTM TIME = ON/OFF TREM DEPTH = ON/OFF TREM RATE = ON/OFF A ENV BIAS = ON/OFF	Pages	2
		Graphic Editing	NO
		Domain	GLOBAL
		Related Functions	(MENU 1-14)

A


B

The parameters in this function are used to specify the effects that will be controlled by DEFINABLE WHEEL 1.

These parameters are exactly the same as those set in MENU 2-03 (AFTER TOUCH) — the only difference being that the effects are controlled during performance by using DEFINABLE WHEEL 1, instead of After Touch (both can be used...).

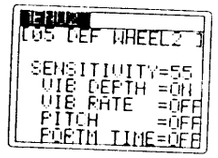
For details on these parameters, see "MENU 2-03 AFTER TOUCH", page 55.

Note that TREM DEPTH, TREM RATE and AMP ENV BIAS levels can be set for each module (M1 ~ M8) independently, in MENU 1-14 (AMP SENS). As with after touch, these independent settings also affect DEF WHEEL 1 control of the above parameters.

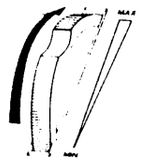
Note also that DEF WHEEL 1 and DEF WHEEL 2 perform basically the same functions, however DEF WHEEL 2 is "spring loaded" (designed to return to the MIN position when released) while DEF WHEEL 1 is not.

05 DEF WHEEL 2

Parameters		O/S	MENU 2 — VALUE — MENU 2 — VALUE
SENSITIVITY = 00 ~ 99	PORTM TIME = ON/OFF	Pages	2 — Graphic Editing — NO
VIB DEPTH = ON/OFF	TREM DEPTH = ON/OFF	Domain	GLOBAL
VIB RATE = ON/OFF	TREM RATE = ON/OFF	Related Functions	⟨MENU 1-14⟩
PITCH = +ON/−ON/OFF	A ENV BIAS = ON/OFF		



A



B

The parameters in this function are used to specify the effects that will be controlled by DEFINABLE WHEEL 2.

These parameters are exactly the same as those set in MENU 2-03 (AFTER TOUCH) — the only difference being that the effects are controlled during performance by using DEFINABLE WHEEL 2, instead of After Touch or DEFINABLE WHEEL 1 (all can be used...).

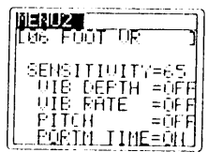
For details on these parameters, see "MENU 2-03 AFTER TOUCH", page 55.

Note that TREM DEPTH, TREM RATE and AMP ENV BIAS levels can be set for each module (M1 ~ M8) independently, in MENU 1-14 (AMP SENS). As with after touch, these independent settings also affect DEF WHEEL 2 control of the above parameters.

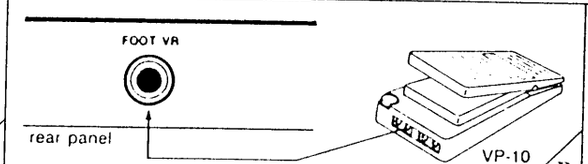
Note also that DEF WHEEL 1 and DEF WHEEL 2 perform basically the same functions, however DEF WHEEL 2 is "spring loaded" (designed to return to the MIN position when released) while DEF WHEEL 1 is not.

06 FOOT VR

Parameters		O/S	MENU 2 — VALUE — MENU 2 — VALUE
SENSITIVITY = 00 ~ 99	PORTM TIME = ON/OFF	Pages	2 — Graphic Editing — NO
VIB DEPTH = ON/OFF	TREM DEPTH = ON/OFF	Domain	GLOBAL
VIB RATE = ON/OFF	TREM RATE = ON/OFF	Related Functions	⟨MENU 1-14⟩
PITCH = +ON/−ON/OFF	A ENV BIAS = ON/OFF		



A



B

The parameters in this function are used to specify the effects that will be controlled by an optional foot pedal (or "foot variable resistor" — hence "FOOT VR").

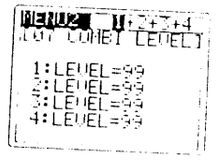
These parameters are exactly the same as those set in MENU 2-03 (AFTER TOUCH) — the only difference being that the effects are controlled during performance by using a foot pedal, instead of After Touch.

For details on these parameters, see "MENU 2-03 AFTER TOUCH", page 55.

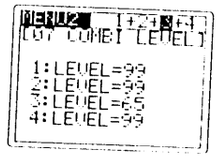
Note that TREM DEPTH, TREM RATE and AMP ENV BIAS levels can be set for each module (M1 ~ M8) independently, in MENU 1-14 (AMP SENS). As with after touch, these independent settings also affect foot-pedal control of the above parameters.

07 LEVEL (COMBINATION)

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
LEVEL = 00 ~ 99	Pages	1
	Graphic Editing	NO
	Domain	COMBINED SOUNDS
	Related Functions	⟨MENU 1-15⟩



A



B

The parameters in this function are used to set relative volume levels of the patches "combined" in the Combination Mode. Naturally, this function can only be accessed after entering this Mode.

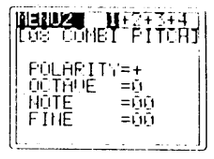
Up to 4 "levels" are set in this function, depending on the number of patches which are combined (according to KEY ASSIGN specifications). Note that the numbers of each parameter correspond with KEY ASSIGN patch numbers (see "KEY ASSIGN," page 81).

If minimum value of "00" is assigned, the corresponding patch will not sound, while a value of "99" indicates a maximum volume level. These settings can be used to "mix" the relative volume levels of all patches making up the combined sound.

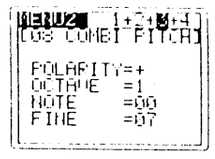
Note that for advanced editing, you can toggle between MENU 2-01 and MENU 2-07 when the cursor is in the FUNCTION NUMBER position (function number flashing) of either function.

08 PITCH

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
POLARITY = + / – OCTAVE = 0 ~ 5 NOTE = 00 ~ 11 FINE = 00 ~ 63	Pages	1
	Graphic Editing	NO
	Domain	COMBINED SOUNDS
	Related Functions	



A



B

The parameters in this function are used to raise or lower the pitch of all patches used to create a "combined sound" in the Combination Mode. Naturally, this function can only be accessed after entering this mode.

The POLARITY parameter is used to specify whether pitch will be raised (+) or lowered (–).

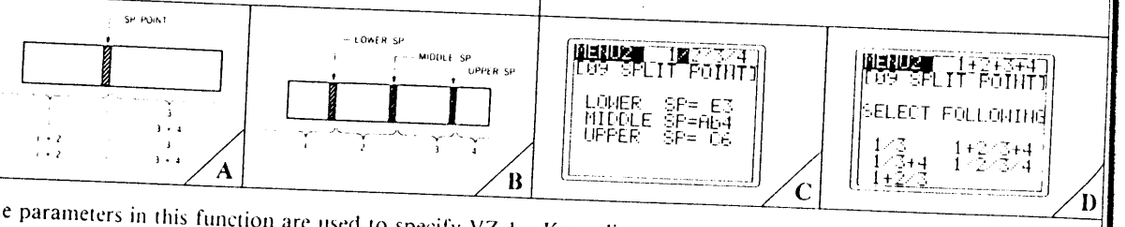
The OCTAVE parameter is used to raise or lower the combined pitch by a maximum of 5 octaves, in 1-octave increments.

The NOTE parameter is used to raise or lower the combined pitch by a maximum of 1100 cents, in 100-cent increments.

The FINE parameter is used to make "fine tuning" adjustments in 1.6-cent increments (approximate). By making "fine" tuning adjustments, a "thick" ensemble sound can be created.

09 SPLIT POINT

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
SP POINT = C0 ~ C9	Pages	1
	Graphic Editing	NO
	Domain	COMBINED SOUND (split)
	Related Functions	



The parameters in this function are used to specify VZ-1 "keyboard split" points in the Combination Mode.

Depending on KEY ASSIGN specifications, either one or three keyboard split points are assigned using this function.

When only one split point is used, as in the KEY ASSIGN configurations in FIG-A, this function contains only one parameter — the SP POINT parameter.

When the KEY ASSIGN configuration in FIG-B is selected, a total of three parameters appear on the display — LOWER SP, MIDDLE SP and UPPER SP (FIG-C). These correspond to the splits in the KEY ASSIGN specification.

Key split ranges for these split points are as shown below;

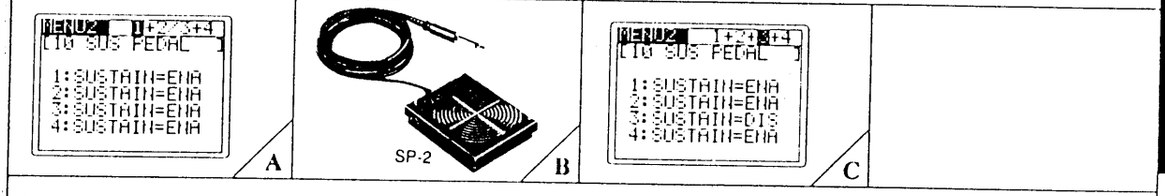
UPPER SP = D0 ~ C9 (chromatic)
MIDDLE SP = C# 0 ~ B8
LOWER SP = C0 ~ B♭ 8

If the parameters in this function are accessed when a KEY ASSIGN configuration has been selected which does not contain any keyboard split point — when patches are "layered" without being split — the display appears as in FIG-D.

If you want to input a split point, you must first exit MENU 2-09 (SPLIT POINT) by pressing the COMBINATION key once again, and choose a KEY ASSIGN configuration which contains a keyboard split point.

10 SUS PEDAL

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
SUSTAIN = ENA / DIS	Pages	1
	Graphic Editing	NO
	Domain	COMBINED SOUNDS
	Related Functions	



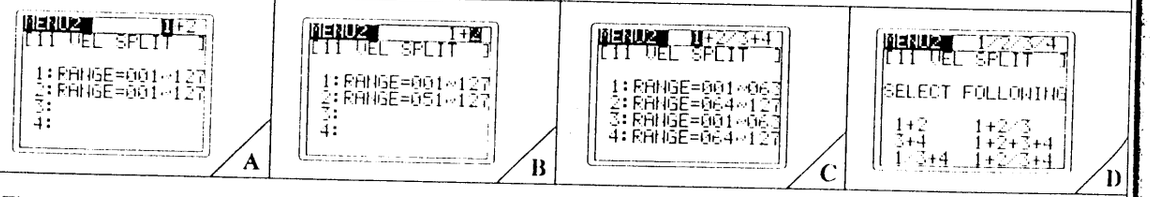
The parameters in this function are used to determine whether individual patches used to create a "combined sound" in the Combination Mode will be affected by sustain pedal (optional, SP-2) operation. Naturally, this function can only be accessed after entering the Combination Mode.

When the SUSTAIN parameter for individual patches in the combined voice is set to ENA (enable), the sustain pedal is effective. The sustain pedal will be non-operational in patches set to DIS (disable).

Note that the numbers of each parameter correspond with KEY ASSIGN patch numbers. Consequently, the number of "active" parameters in this function will be directly related to the present KEY ASSIGN configuration (see "KEY ASSIGN," page 81).

11 VEL SPLIT

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
RANGE = 001 ~ 127	Pages	1
	Graphic Editing	NO
	Domain	COMBINED SOUNDS (Layered)
	Related Functions	



The parameters in this function are used to specify VZ-1 "velocity split" characteristics in the Combination Mode. Depending on KEY ASSIGN specifications, between one and four velocity split "ranges" are assigned using these parameters.

By assigning maximum and minimum "velocity" values (001 ~ 127) to each patch in a combined sound, you can create a "velocity range" wherein the specified patch will sound. If the key is played at a velocity level that is outside this range, the specified patch will not sound.

Note that this function differs from the "KEYBOARD SPLIT" function, as VEL SPLIT can only be used with KEY ASSIGN configurations containing "layered" (+) patches (such as "1 + 2" or "1/3 + 4"), as opposed to KEY ASSIGN configurations containing only "split" points (such as "1/3" or "1/2/3/4"). (FIG-A, B, C)

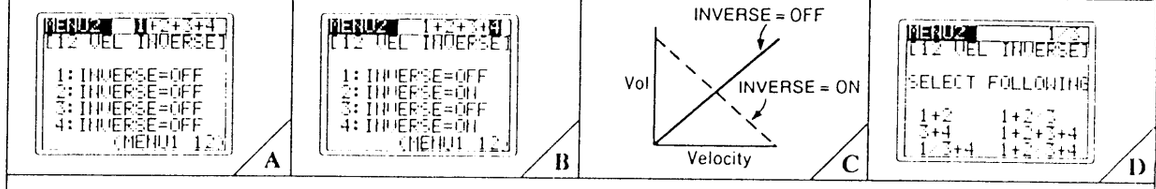
If the parameters in this function are accessed when a KEY ASSIGN configuration has been selected which contains only keyboard split points — without any "layered" patches, the display appears as in FIG-D.

Note also that the numbers of each parameter correspond with KEY ASSIGN patch numbers. Consequently, the number of "active" parameters in this function will be directly related to the present KEY ASSIGN configuration (see "KEY ASSIGN," page 81).

If you want to use velocity split, you must first exit MENU 2-11 (VEL SPLIT) by pressing the COMBINATION key once again, and choose a KEY ASSIGN configuration which contains layered patches (for example, "1 + 2"). (See FIG-D)

12 VELOCITY INVERSE

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
INVERSE = ON / OFF	Pages	1
	Graphic Editing	NO
	Domain	COMBINED SOUNDS (Layered)
	Related Functions	(MENU 1-12)



The parameters in this function let you choose whether you want to literally "invert" the velocity level curves created in MENU 1-12 for each patch in a combined sound. Depending on KEY ASSIGN specifications, between two and four toggles are contained in this function, which turn the INVERSE function On or Off for each patch in the combined sound.

By "inverting" the VELOCITY LEVEL curve for any given patch, the velocity characteristics are actually "inverted" so that modules in a patch previously "triggered" only by a fairly high velocity rate (strong keyboard attack) are turned OFF by a high velocity rate. In other words, the velocity characteristics for the selected patch is virtually reversed, as illustrated in FIG-C.

Note that this function is similar to the VEL SPLIT function, as it can only be used with KEY ASSIGN configurations containing "layered" (+) patches (such as "1 + 2" or "1/3 + 4"), as opposed to KEY ASSIGN configurations containing only "split" points (such as "1/3" or "1/2/3/4").

If the parameters in this function are accessed when a KEY ASSIGN configuration has been selected which contains only keyboard split points — without any "layered" patches, the display appears as in FIG-D.

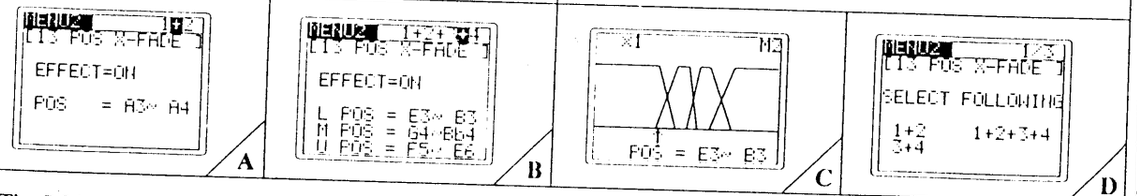
Note also that the numbers of each parameter correspond with KEY ASSIGN patch numbers. Consequently, the number of "active" parameters in this function will be directly related to the present KEY ASSIGN configuration (see "KEY ASSIGN," page 81).

If you want to use VEL INVERSE, you must first exit MENU 2-12 (VEL INVERSE) by pressing the COMBINATION key once again, and choose a KEY ASSIGN configuration which contains layered patches (for example, "1 + 2").

NOTE: In the cases listed below, velocity curves of each module are not inverted — even when the INVERSE function is set to ON;
— When the INT LINE is set to PHASE for any particular LINE.
— When EXT PHASE is specified for a particular LINE.

13 POSITIONAL CROSSFADE

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
EFFECT = ON/OFF POS = C0 ~ C9	Pages	1 — Graphic Editing: YES
	Domain	COMBINED SOUNDS (Layered)
	Related Functions	



The POS CROSSFADE function can only be utilized in the Combination Mode, when a KEY ASSIGN configuration containing only "layered" patches is selected (such as "1 + 2", "3 + 4" and "1 + 2 + 3 + 4").

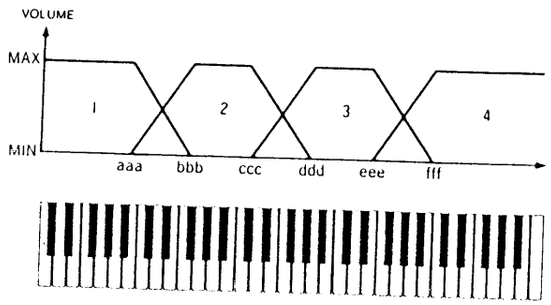
This function is used to "fade" together patches at a certain point on the keyboard (known as the "cross point"), by determining the range on the keyboard that wherein the patches will fade together (known as the "cross position" or "POS").

As FIG-E illustrates, in the cross position range (aaa-bbb), one patch becomes progressively more audible, as the other becomes softer and gradually fades out entirely. This creates a "fading" effect, so that there is no audible cutoff point — one patch simply fades into the other as you move up or down the keyboard.

This function, then, features two basic types of parameters — an EFFECT toggle, which is used to turn the CROSS-FADE effect ON or OFF, and POS range settings for each CROSS POSITION. Depending on KEY ASSIGN specifications, either one or three POS ranges are set (FIG-A, B).

When the KEY ASSIGN configuration in FIG-B is selected, a total of three parameters appear on the display — LOWER POS, MIDDLE POS and UPPER POS. These correspond to the three X-FADE positions in the 4-patch layered KEY ASSIGN configuration, as illustrated in FIG-E.

FIG-E



If the parameters in this function are accessed when a KEY ASSIGN configuration has been selected which contains keyboard split points — as opposed to only "layered" patches, the display appears as in FIG-D.

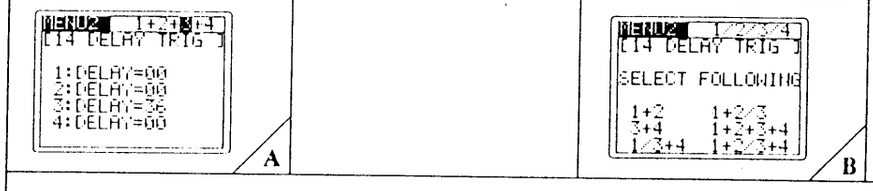
If you want to use POSITIONAL CROSS FADE and a split KEY ASSIGN configuration is selected, you must first exit MENU 2-13 (POS X-FADE) by pressing the COMBINATION key once again, and choose a KEY ASSIGN configuration which contains only layered patches (for example, "1 + 2").

GRAPHIC DISPLAY

This function features graphic display capabilities, which allow you to view and edit X-FADE positions graphically (FIG-C). (For details on graphic editing, see page 25.) Note that the "ZOOM" function can only be used to enlarge view (×1 ~ ×4).

14 DELAY TRIGGER

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
DELAY = 00 ~ 99	Pages	1 — Graphic Editing: NO
	Domain	COMBINED SOUNDS (Layered)
	Related Functions	



The delay trigger function can be used to "delay" the NOTE ON message for any layered patch(es) in a combined sound. Delay time is increased as the DELAY parameter value is raised. At a value of "00", the patch is sounded immediately after key depression, while at a value of "99", there is a long delay before the patch sounds.

Note that this function can only be used with KEY ASSIGN configurations containing "layered" (+) patches (such as "1 + 2" or "1/3 + 4"), as opposed to KEY ASSIGN configurations containing only "split" points (such as "1/3" or "1/2/3/4").

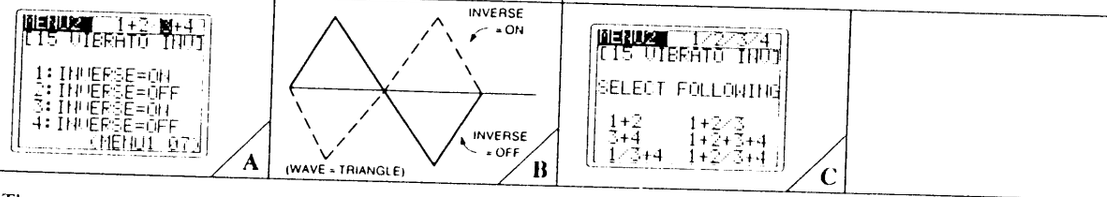
If the parameters in this function are accessed when a KEY ASSIGN configuration has been selected which contains only keyboard split points — without any "layered" patches, the display appears as in FIG-B.

Note also that the numbers of each parameter correspond with KEY ASSIGN patch numbers. Consequently, the number of "active" parameters in this function will be directly related to the present KEY ASSIGN configuration (see "KEY ASSIGN," page 81).

If you want to use DELAY TRIG and a KEY ASSIGN configuration is selected which contains only split patches (such as 1/3), you must first exit MENU 2-14 (DELAY TRIG) by pressing the COMBINATION key once again, and choose a KEY ASSIGN configuration which contains layered patches (for example, "1 + 2").

15 VIBRATO INVERSE

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
INVERSE = ON / OFF	Pages	1 — Graphic Editing — NO
	Domain	COMBINED SOUNDS (Layered)
	Related Functions	⟨MENU 1-07⟩



The parameters in this function let you choose whether you want to literally "invert" the phase of the vibrato effect for each patch in a combined sound. Depending on KEY ASSIGN specifications, between two and four toggles are contained in this function, which turn the INVERSE function On or Off for each patch in the combined sound.

By "inverting" the vibrato phase for any given patch, the vibrato characteristics are actually reversed, so the vibrato "cycle" becomes "inverted." In other words, by inverting the vibrato phase, the pitch will rise in the part of the vibrato cycle where it would normally fall, and fall where it would normally rise, as illustrated in FIG-B.

As with the DELAY TRIGGER function, this function can only be used with KEY ASSIGN configurations containing "layered" (+) patches (such as "1 + 2" or "1/3 + 4"), as opposed to KEY ASSIGN configurations containing only "split" points (such as "1/3" or "1/2/3/4").

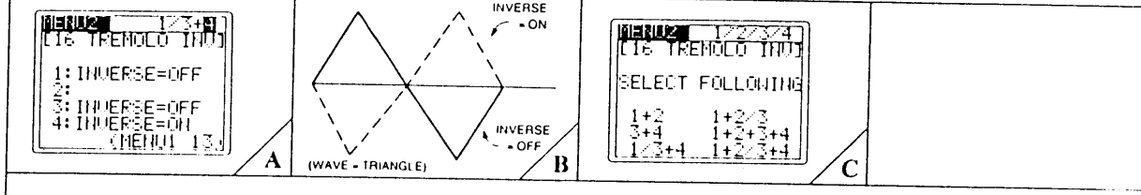
If the parameters in this function are accessed when a KEY ASSIGN configuration has been selected which contains only keyboard split points — without any "layered" patches, the display appears as in FIG-C.

Note also that the numbers of each parameter correspond with KEY ASSIGN patch numbers. Consequently, the number of "active" parameters in this function will be directly related to the present KEY ASSIGN configuration (see "KEY ASSIGN," page 81).

If you want to use VIB INVERSE, you must first exit MENU 2-15 (VIB INVERSE) by pressing the COMBINATION key once again, and choose a KEY ASSIGN configuration which contains layered patches (for example, "1 + 2").

16 TREMOLO INVERSE

Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
INVERSE = ON / OFF	Pages	1 — Graphic Editing — NO
	Domain	COMBINED SOUNDS (Layered)
	Related Functions	⟨MENU 1-13⟩



The parameters in this function let you choose whether you want to literally "invert" the phase of the tremolo effect for each patch in a combined sound. Depending on KEY ASSIGN specifications, between two and four toggles are contained in this function, which turn the INVERSE function On or Off for each patch in the combined sound.

By "inverting" the tremolo phase for any given patch, the tremolo characteristics are actually reversed, so the tremolo "cycle" becomes "inverted." In other words, by inverting the tremolo phase, the volume will rise in the part of the tremolo cycle where it would normally fall, and fall where it would normally rise, as illustrated in FIG-B.

Note that this function is similar to the VEL INVERSE function, as it can only be used with KEY ASSIGN configurations containing "layered" (+) patches (such as "1 + 2" or "1/3 + 4"), as opposed to KEY ASSIGN configurations containing only "split" points (such as "1/3" or "1/2/3/4").

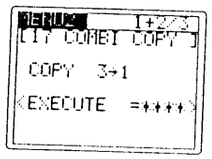
If the parameters in this function are accessed when a KEY ASSIGN configuration has been selected which contains only keyboard split points — without any "layered" patches, the display appears as in FIG-C.

Note also that the numbers of each parameter correspond with KEY ASSIGN patch numbers. Consequently, the number of "active" parameters in this function will be directly related to the present KEY ASSIGN configuration (see "KEY ASSIGN," page 81).

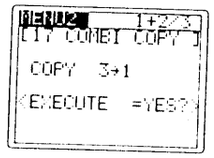
If you want to use TREMOLO INVERSE, you must first exit MENU 2-16 (TREMOLO INVERSE) by pressing the COMBINATION key once again, and choose a KEY ASSIGN configuration which contains layered patches (for example, "1 + 2").

17 COMBI COPY

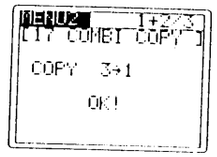
Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
COPY 1-4→1-4	Pages	1 — Graphic Editing — NO
	Domain	COMBINED SOUNDS
	Related Functions	⟨MENU 2-01 ~ 08⟩ ⟨MENU 2-10 ~ 12⟩ ⟨MENU 2-14 ~ 16⟩



A



B



C

The COMBI COPY function can be used to "copy" the MENU 2 effect and timbre data of one patch in a combination to another patch position.

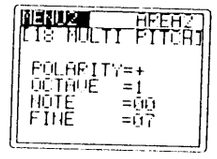
For example, the patch number and effect data (MENU 2-01 ~ 16) assigned to the Patch 1 position can be copied into any of the 3 remaining positions by using this function.

Copying can be executed by simply specifying the "source" patch number, and the patch number of the "destination" patch (FIG-A). After this, just move the cursor to the execute position (FIG-B) and press the YES key (FIG-C).

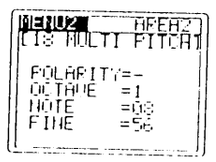
Data which is copied includes the source patch timbre, and all effect data specified using MENU 2 functions 01 through 16, with the exception of 9 and 13.

18 PITCH

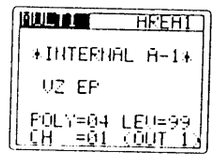
Parameters	O/S	MENU 2 — VALUE — MENU 2 — VALUE
POLARITY = + / − OCTAVE = 0 ~ 5 NOTE = 00 ~ 11 FINE = 00 ~ 63	Pages	1 — Graphic Editing — NO
	Domain	AREA (MIDI)
	Related Functions	⟨MENU 3-00⟩



A



B



C

The parameters in this function can be used to set or alter the pitch of each AREA in the MULTI CHANNEL mode. Naturally, this function can only be accessed after entering the MULTI CHANNEL Mode.

After selecting "PLAY" sub-mode, (see Performance/Editing in the Multi Channel Mode on page 86) you must specify the multi-channel AREA for which you want to set the pitch, by using the MULTI AREA keys (FIG-C). When areas 1 through 4 are selected, output 1 is automatically displayed, while output 2 is displayed when areas 5 through 8 are selected. Then return to MENU 2-18 (FIG-A) by pressing the MENU 2 key.

The POLARITY parameter is used to specify whether pitch will be raised (+) or lowered (−).

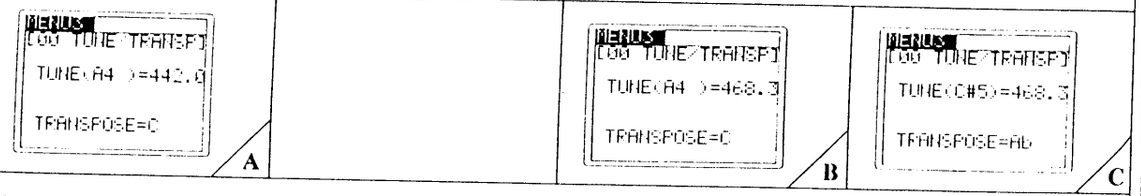
The OCTAVE parameter is used to raise or lower the pitch of the selected AREA by a maximum of 5 octaves, in 1-octave increments.

The NOTE parameter is used to raise or lower the pitch of the selected AREA by a maximum of 1100 cents, in 100-cent increments.

The FINE parameter is used to make "fine tuning" adjustments in 1.6-cent increments (approximate).

00 TUNE/TRANSPOSE

Parameters	O/S	MENU 3 — VALUE — MENU 3 — VALUE
	Pages	1 Graphic Editing NO
TUNE (***) = 417.2 – 442 – 468.3 TRANSPOSE = G – F#	Domain	GLOBAL
	Related Functions	⟨MENU 2-18⟩



The parameters in this function can be used to set the overall "tuning" of the VZ-1, as well as alter the standard key by using a built-in TRANSPOSE function.

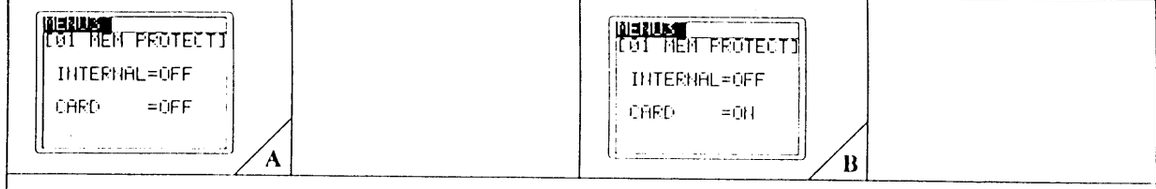
The TUNE parameter allows you to set the standard A4 tuning within a range of 417.2 and 468.3 Hz (+/– 100 cents from standard), in approximately 1.6-cent increments. (This setting is approximate — use it only as a guide.) The initialized value for this parameter is "A4 = 442". (FIG-A)

The TUNE parameter can be reset to its initialized value (A4 = 442Hz) by pressing both cursor keys simultaneously.

The TRANSPOSE parameter lets you "transpose" the VZ-1 standard pitch frequency (for example, A4 = 442) to other key positions. In other words, the pitch that would normally correspond to A4 can be "shifted" chromatically to another key, within a range of E♭ 4 to D5. This effectually transposes the overall VZ-1 performance key. Notice that when you change the TRANSPOSE setting, the pitch assigned to the TUNE position changes as well (FIG-C).

01 MEMORY PROTECT

Parameters	O/S	MENU 3 — VALUE — MENU 3 — VALUE
	Pages	1 Graphic Editing NO
INTERNAL = ON/OFF CARD = ON/OFF	Domain	GLOBAL
	Related Functions	⟨MENU 3-02⟩ ⟨MENU 3-06⟩



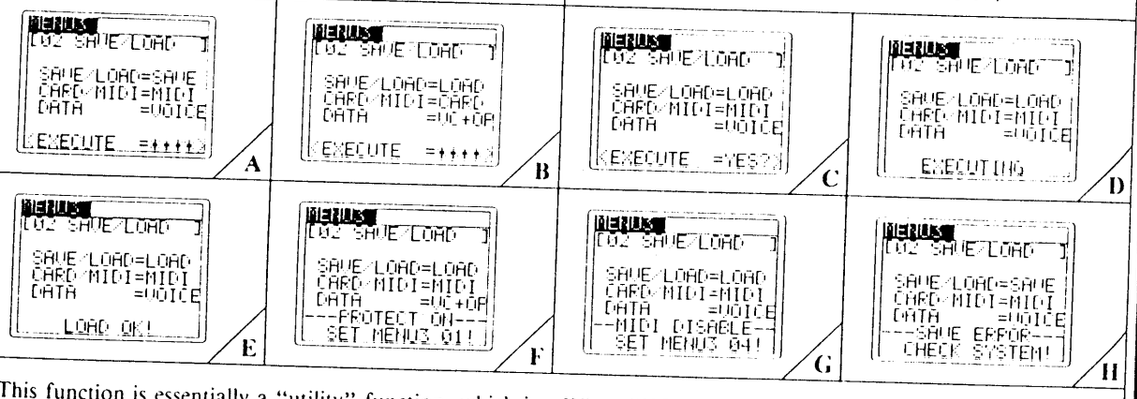
The parameters in this function can be used to protect the VZ-1 built-in memories, so that data cannot be altered or erased.

The INTERNAL parameter features a toggle which can be turned ON or OFF. When set to ON, the contents of the VZ-1's internal and operation memories will be protected.

The CARD parameter also features a toggle which can be turned ON or OFF. When set to ON, the contents of sound and operation memories on VZ-1 RAM cards will be protected.

02 SAVE/LOAD

Parameters	O/S	MENU 3 — VALUE — MENU 3 — VALUE
SAVE/LOAD = SAVE/LOAD CARD/MIDI = CARD/MIDI DATA = VOICE/OPEM/VC + OP	Pages	1 — Graphic Editing — NO
	Domain	GLOBAL
	Related Functions	⟨MENU 3-01⟩ ⟨MENU 3-06⟩



This function is essentially a "utility" function, which is used to control data SAVE and LOAD operations.

The SAVE/LOAD parameter is used to specify the type of operation you want to perform. When SAVE is selected, VZ-1 data will be "saved" to an external memory medium, while when LOAD is selected, external data will be "loaded" into the VZ-1's onboard memory.

The CARD/MIDI parameter lets you choose the medium to/from which you will SAVE or LOAD data.

When CARD is selected, data will either be saved to, or loaded from a RAM/ROM card inserted in the VZ-1 card slot. When MIDI is selected, data will be transferred to or from another VZ-1.
When using a new RAM card, you must first format it (see MENU 3-06).

The DATA parameter lets you choose the type or combination of data which will be saved or loaded. You can choose from three different settings — VOICE, OP MEM or VC + OP. Note, however, that when using two VZ-1 units connected by MIDI, this setting must be the same for both units.

When "VOICE" is selected, all 64 internal sounds can be transferred to or from the VZ-1's internal memory. When "OP MEM" is selected, only data from the 64 operation memories can be transferred to or from the VZ-1.

When "VC + OP" is selected, data from both the 64 internal sounds and the 64 operation memories can be transferred to or from the VZ-1.

Once you've specified the operation you want to perform, simply move the cursor to the "EXECUTE" position (FIG-C), and press the YES key (FIG-D, E).

If you want to abort data transmission, simply press the MENU 3 key of the transmitting or receiving VZ-1.

Note that when an Operation Memory featuring INTERNAL sounds is SAVED to a card, the sound specification on the display automatically changes to "CARD" for the formerly INTERNAL sounds.

Note that while you can transmit data with only one MIDI cable (through MIDI OUT to MIDI IN of receiving device), you must first abort data transmission by pressing MENU 3 key of the transmitting VZ-1.

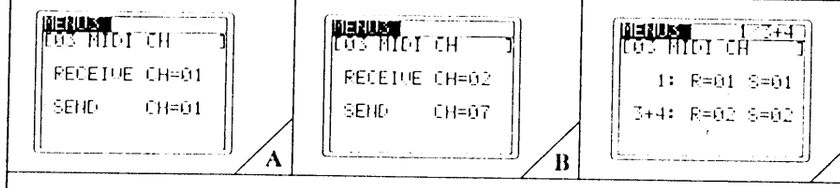
Note that if the memory protect is set to ON (MENU 3-01), it will be impossible to LOAD data. (FIG-F)

Note that if MIDI Exclusive is disabled (MENU 3-04), basic channels do not match (MENU 3-03)or MIDI ON/OFF switch (back panel) is set to OFF, MIDI LOAD will be impossible. (FIG-G)

If data is not transferred successfully for some reason, MIDI SAVE/LOAD will be impossible and display appears as in FIG-H.

03 MIDI CH

Parameters	O/S	MENU 3 — VALUE — MENU 3 — VALUE
RECEIVE CH = 01 ~ 16 SEND CH = 01 ~ 16	Pages	1 — Graphic Editing — NO
	Domain	GLOBAL
	Related Functions	



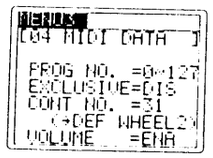
This function features two basic parameters — RECEIVE and SEND — which are used to specify the MIDI channels (01 ~ 16) on which the VZ-1 will receive and transmit MIDI messages.

Note that when you've selected a keyboard split configuration in the COMBINATION or OPERATION MEMORY mode, the display will appear as in FIG-C, allowing you to specify separate SEND and RECEIVE channels for each sound in the split configuration.

Also note that when you're in the MULTI CHANNEL mode, you can set separate channels for each multi-channel AREA while in the PLAY sub-mode (see page 11). The setting made using the MIDI CH function (MENU 3-03) is the common MIDI Basic Channel for all 8 areas.

04 MIDI DATA

Parameters	O/S	MENU 3 — VALUE — MENU 3 — VALUE
PROG NO. = 0 ~ 127 / 0 ~ 63 / DIS EXCLUSIVE = ENA / DIS CONT NO. = OFF / 12 ~ 31 VOLUME IN = ENA / DIS	Pages	1 — Graphic Editing — NO
	Domain	GLOBAL
	Related Functions	



A

B

The parameters in this function are used to specify a variety of MIDI-related data (with the exception of the MIDI Basic Channel).

The PROGRAM NO parameter lets you choose the MIDI PROGRAM CHANGE message number. Note that messages are distributed as shown in the chart below. You can choose from DIS, 0-63, and 0-127 settings with the VALUE controls.

〈TRANSMIT〉

PROG. NO.	INTERNAL A1 ~ H8	CARD A1 ~ H8
0-127	0-63	64-127
0-63	0-63	0-63
DIS	×	×

〈RECEIVE〉

PROG NO.	INTERNAL A1 ~ H8	CARD A1 ~ H8
0-127	0-63	64-127
0-63	0-63 64-127	0-63 64-127
DIS	×	×

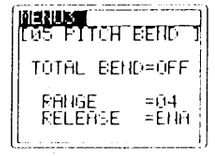
The EXCLUSIVE parameter lets you choose whether or not sound or operation data or multi-channel mode data is transmitted / received according to MIDI System Exclusive messages. When it is set to ENA (enable), MIDI communication can be controlled through these messages.

The CONT NO (control number) parameter is used to specify the Control Change number of messages controlled by Definable Wheel 2. When set to OFF, MIDI OUT / IN messages are not transmitted.

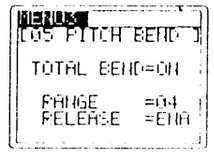
The VOLUME parameter can be used to specify whether or not the VZ-1 will transmit and receive MIDI Volume messages (control change 07). When set to ENA (enable), the VZ-1's volume level can be controlled by MIDI messages from an external device. When set to DIS (disable), the VZ-1's volume is independent of external control. In addition, MIDI Volume messages are not output when set to DIS.

05 PITCH BEND

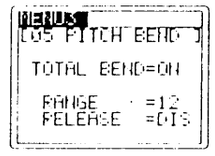
Parameters	O/S	MENU 3 — VALUE — MENU 3 — VALUE
TOTAL BEND = ON / OFF BEND RANGE = 00 ~ 48 RELEASE = ENA / DIS	Pages	1 — Graphic Editing — NO
	Domain	GLOBAL
	Related Functions	〈MENU 2-02〉



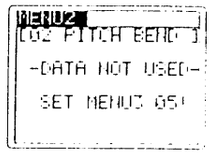
A



B



C



D

The pitch bend parameters are used to control the pitch-bend "range" and "release" parameters globally — for all voices. This function is useful when using the VZ-1 as a sound source for MIDI instruments which require a "uniform" bend range for all sounds — like the Casio MIDI guitar.

The TOTAL BEND parameter is a toggle which can be used to specify "total" control. When this parameter is OFF, normal bend RANGE(s) and RELEASE setting(s) using MENU 2-02 control pitch bend. However when this is ON, the MENU 3-05 settings take control of settings for all VZ-1 sounds.

The BEND RANGE parameter can be used to raise or lower the maximum limit that pitch can be bended, in half-step increments. At the minimum value of "00", the pitch bend wheel has no effect on pitch, while at the maximum value of "48", you can bend notes a maximum of 48 half-steps (4 octaves), up and down.

The RELEASE parameter lets you choose whether or not the pitch bend wheel can be used to bend sounds which are sustained after the keyboard is released.

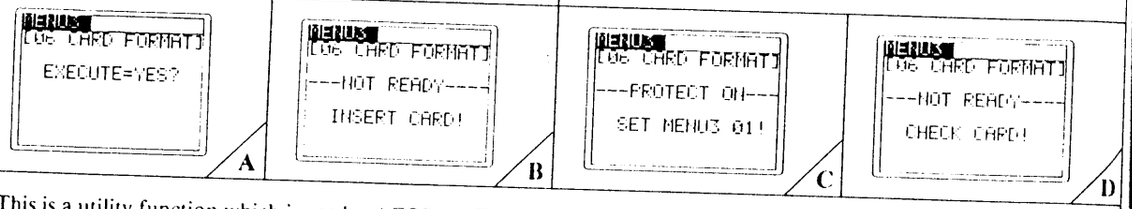
When this parameter is set to DIS (disable), you can bend notes only while actually playing them (before the release point in DCA curve).

When set to ENA (enable), you can also bend any note that is still sounding (portion of sound following the release point in DCA curve) — even after releasing the corresponding key.

Note that if the TOTAL BEND parameter in MENU 3-05 is set to "ON", the settings in MENU 2-02 made using this function will be disabled, and the display will appear as in MENU 2-02 (FIG-D).

06 CARD FORMAT

Parameters	O/S	MENU 3 — VALUE — MENU 3 — MODULE ON
	Pages	1
	Graphic Editing	NO
	Domain	RAM CARDS
	Related Functions	⟨MENU 3-01⟩



This is a utility function which is used to "FORMAT" the VZ-1 accessory RAM card. Before you can store information in RAM cards, you must "initialize" them into a format that the VZ-1 understands.

By executing the FORMAT command, all former contents are erased from the card, and it is prepared to receive fresh VZ-1 sound data. When the RAM card is formatted, it is automatically programmed with the VZ-1's 64 preset patches and 64 preset operation memories.

After inserting the card you want to format in to the card slot, you simply access this function's EXECUTE parameter. A "YES?" prompt will appear on the display (FIG-A). To execute formatting, press the YES key.

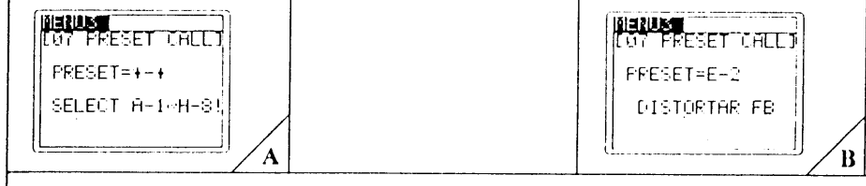
If you try to execute formatting without first inserting a RAM card, the display will appear as in FIG-B. First insert the card and try again!

If you try to execute formatting when the memory protect function (MENU 3-01) is ON, the display will appear as in FIG-C. First turn this function OFF, and try again!

If you try to execute formatting when an optional ROM (not "RAM" but "ROM") card is inserted in the card slot, the display will appear as in FIG-D. There is no need to format ROM cards.

07 PRESET CALL

Parameters	O/S	MENU 3 — VALUE — MENU 3 — MODULE ON/OFF (A ~ H) & MODULE SELECT (1 ~ 8)
	Pages	1
	Graphic Editing	NO
PRESET = A ~ H — 1 ~ 8	Domain	GLOBAL
	Related Functions	



The VZ-1 features a "Preset Call" memory function, which lets you store VZ-1 internal patches in the COMPARE/RECALL memory area. By "loading" a patch into the COMPARE/RECALL area, you leave the normal INTERNAL memory space available for edited sounds.

To input patches into the COMPARE/RECALL area, first select the PRESET CALL function (MENU 3-07). Next, enter the PLAY sub-mode and access the PRESET parameter by pressing the MENU 3 key once again.

You can then select the patch number you want to move to the COMPARE/RECALL area by pressing the bank and number keys (A ~ H / 1 ~ 8) (FIG-B). You can load up to 64 patches with this function by repeatedly selecting patches at this step in the procedure. (Remember, though, that while you can cycle through new sounds and place them in the COMPARE/RECALL buffer, your previous sound will be deleted whenever you choose a new one.)

Note that this function is only operable in the NORMAL mode.

Performance/Editing in the Normal Mode

To select sounds for performance in the normal mode

①After pressing the NORMAL mode key, select the PLAY sub-mode by pressing the PLAY key.

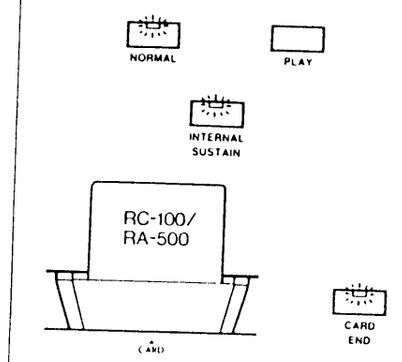
②If you want to choose an **INTERNAL** patch, press the INTERNAL key.

If you want to choose a **CARD** patch, first insert the RAM or ROM card in the card slot and then press the CARD key.

When a ROM card is used, you can shift between ROM card banks 1 and 2 by pressing the CARD key once again. Each card bank holds up to 64 patches and 64 operation memories.

When using a new RAM card, you must first format it (see page 77). A formatted RAM card is capable of storing up to 64 patches and 64 operation memories.

③Select the patch you want to play by pressing a BANK key (letters A through H) and a VOICE selector (numbers 1 through 8).

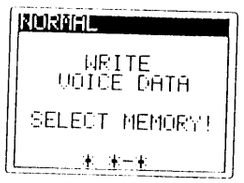


To write a single patch to memory

①Select the patch you want to write to memory (internal or card patch or Compare/Recall ON/OFF).

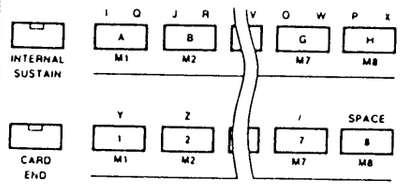
②Hold down the WRITE key.

The LCD appears as shown at the right, and the INTERNAL/CARD indicators go out. If you release the WRITE key, the LCD will return to its normal status.

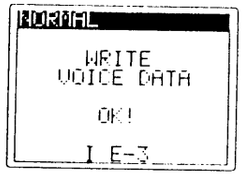


If you've used the COMPARE/RECALL function when editing a patch using MENU 1 functions, be sure that the COMPARE/RECALL indicator is ON. If it is OFF, press the COMPARE/RECALL key.

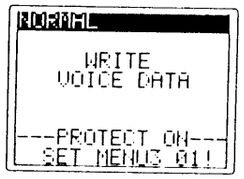
③While still holding down the WRITE key, select the memory to which you want to write the patch (INTERNAL or CARD key, followed by A-H and 1-8 selectors).



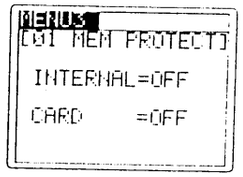
When writing is completed successfully, an "OK!" message appears on the display.



If the memory protect function (MENU 3-01) is ON, writing will be impossible. In this case, you must first turn the protect function OFF by accessing MENU 3-01, reenter the PLAY mode and perform write operations again.



For information on writing patch data to the OPERATION MEMORY, see page 84.



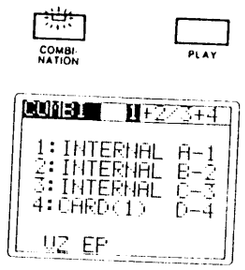
To edit a single patch

To edit a single patch in the NORMAL mode, simply press the MENU selector corresponding to the function which you want to edit, and access the function. For further data on MENUs, FUNCTIONs and PARAMETERs, refer to page 16.

Performance/Editing in the Combination Mode

To specify KEY ASSIGN configurations

①After entering the Combination PLAY sub-mode, you can select from one of 8 different "KEY ASSIGN" configurations by pressing the VALUE keys. When the VALUE keys are pressed, key assign configurations change cyclically.



The VALUE slider cannot be used to select KEY ASSIGN configuration.

KEY ASSIGN CONFIGURATIONS

( ) .... polyphonic

DISPLAY \ OUT	MIX OUT PUT	LINE OUT 1	LINE OUT 2	HEADPHONES L	HEADPHONES R
1+2	1+2	1 (8)	2 (8)	1 (8)	2 (8)
3+4	3+4	3 (8)	4 (8)	3 (8)	4 (8)
1+2+3+4	1+2+3+4	1+2 (4)	3+4 (4)	1+2 (4)	3+4 (4)
1/3	1/3	1 (8)	3 (8)	1 (8)	3 (8)
1/3+4	1/3+4	1 (8)	3+4 (4)	1 (8)	3+4 (4)
1+2/3	1+2/3	1+2 (4)	3 (8)	1+2 (4)	3 (8)
1+2/3+4	1+2/3+4	1+2 (4)	3+4 (4)	1+2 (4)	3+4 (4)
1/2/3/4	1/2/3/4	1/2 (4/4)	3/4 (4/4)	1/2 (4/4)	3/4 (4/4)

* Note that when cross-fade is used, each sound features 8-note polyphony.
** Note that when cross-fade is used, each sound features 4-note polyphony.

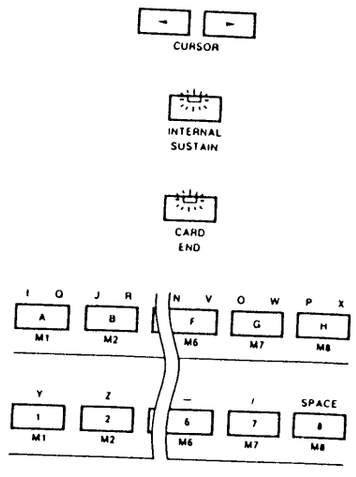
To select patches in a combined sound

①After entering the Combination PLAY sub-mode, move the CURSOR to any patch position.

②If you want to choose an **INTERNAL** patch, press the INTERNAL key.

If you want to choose a **CARD** patch, first insert the RAM or ROM card in the card slot and then press the CARD key.

③Select the patch you want to play by pressing a BANK key (letters A through H) and a VOICE selector (numbers 1 through 8).



Depending on the KEY ASSIGN configuration which you have selected, some patch assign positions will not be "active" (no patch name will be displayed).
If, for example, the displayed KEY ASSIGN configuration is "1/3+4", no patch will be displayed for position "2". Note, however, that if you change the KEY ASSIGN configuration so that patch #2 becomes active, the specified patch for position "2" will return to the display.

If 2 or more CARD patches are selected in any combined sound, the second and succeeding card patches will not sound immediately even though they appear on the display. To "write" them into the combined sound, you must press the combination key once again, after selecting all patches you want in the sound.

To write a single patch to memory

①Select the patch you want to write to memory from the COMBINATION display (internal or card patch 1, 2, 3 or 4).

②Hold down the WRITE key.

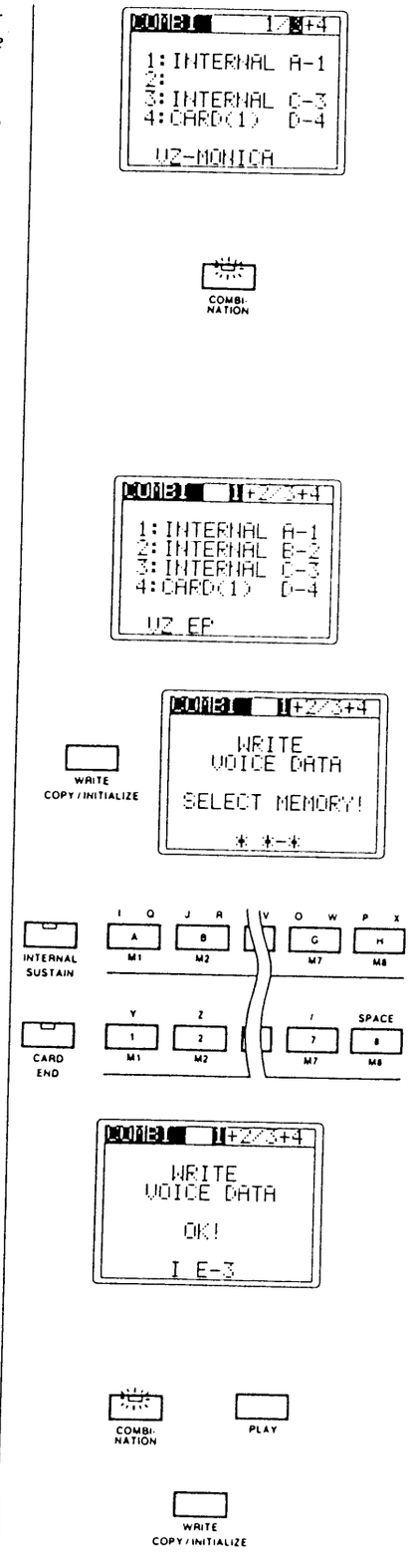
③While still holding down the WRITE key, select the memory to which you want to write the patch (INTERNAL or CARD key, followed by A-H and 1-8 selectors).

When writing is completed successfully, an "OK!" message appears on the display.

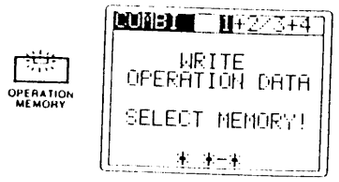
To write Combination data to the OPERATION MEMORY

①Select the COMBINATION mode and edit your combined sound until you are satisfied. Then press the PLAY key to enter the PLAY sub-mode.

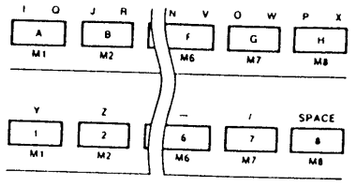
②Hold down the WRITE key.



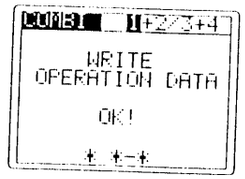
③Press the OPERATION MEMORY key.



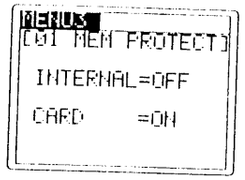
④While still holding down the WRITE key, select the memory to which you want to write the patch (INTERNAL or CARD key, followed by A-H and 1-8 selectors).



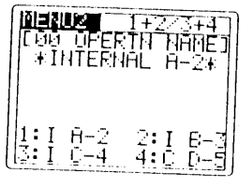
When writing is completed successfully, an "OK!" message appears on the display.



If the memory protect function (MENU 3-01) is ON, writing will be impossible. In this case, you must first turn the protect function OFF by accessing MENU 3-01, reenter the PLAY mode and perform write operations again. Also, it is impossible to write to the Operation Memory when the COMPARE/RECALL function is ON, regardless of the selected key assign setting. For example, if COMPARE/RECALL function is set to ON for key assignment "3+4", it will be impossible to write when 1+2 is selected as well. If "C/R ON CHECK VOICE NO.!" messages are displayed, be sure to turn the COMPARE/RECALL function OFF for all patches.
Note that writing to the operation memory must be performed in the PLAY sub-mode.



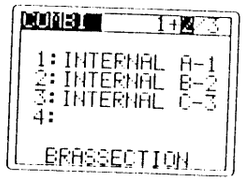
⑤Once you've completed writing combined sound data to the operation memory, you can give it a name by using the OPERATION NAME function in Menu 2 (MENU 2-00). (After assigning a name, you must re-write the sound again to the Operation Memory.)



To edit sound and effect data

Because the combination mode allows you to work with up to 4 patches at a time, you must first specify the patch you want to alter when editing sound data.

①Enter the PLAY sub-mode and move the cursor to the patch position corresponding to the patch you want to edit.



②Press the MENU 1 key. You can now access sound-related functions in MENU 1 to edit the sound parameters of the selected patch.

For further data on MENUs, FUNCTIONs and PARAMETERs, refer to page 16.

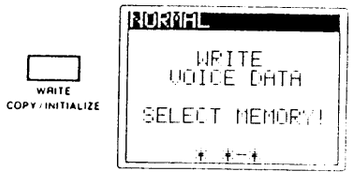
Performance/Editing in the Operation Memory Mode

The OPERATION MEMORY mode can be used to store effect and sound data from up to 64 sounds (patches or combined sounds) from the VZ-1 internal memory or card memory.

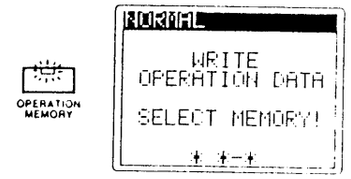
To copy data from the Normal Mode memory into the Operation Memory

①After entering the Normal Mode, select the Play sub-mode by pressing the PLAY key.

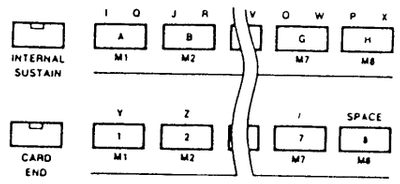
②Hold down the WRITE key. The display appears as shown on the right.



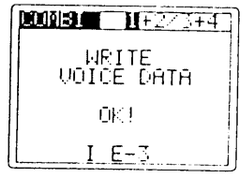
③Press the OPERATION MEMORY key.



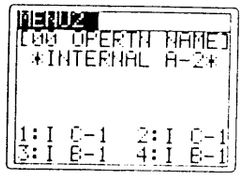
④While still holding down the WRITE key, select the patch you want to WRITE by first pressing either the INTERNAL key or the CARD key, and then pressing a BANK key (letters A through H) and a VOICE selector (numbers 1 through 8).



When writing is completed successfully, an "OK !" message appears on the display.

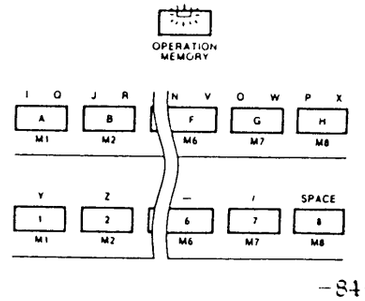


⑤Once you've completed writing combined sound data to the operation memory, you can give it a name by using the OPERATION NAME function in Menu 2 (MENU 2-00). (After assigning a name, you must re-write the sound again to the Operation Memory. The OPERATION NAME function can only be set while in the OPERATION MEMORY mode.)

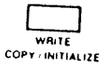


To write operation memory data from one operation memory to another

①After entering the Operation Memory Mode, select the operation you want to transfer by pressing a BANK key and a VOICE selector.

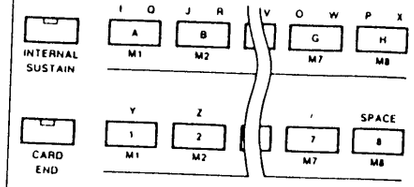


②Hold down the WRITE key.

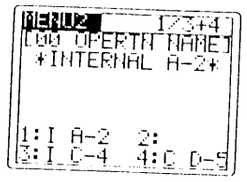


③Select the operation memory you want to transfer the selected operation memory to by pressing a BANK key (letters A through H) and a VOICE selector (numbers 1 through 8).

When writing is completed successfully, an "OK !" message appears on the display.

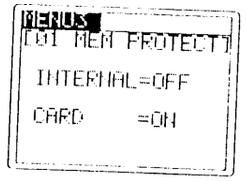


④Once you've completed transferring the operation memory data, you can give it another name by using the OPERATION NAME function in Menu 2 (MENU 2-00). (After assigning a name, you must re-write the sound again to the Operation Memory).



If the memory protect function (MENU 3-01) is ON, writing will be impossible. In this case, you must first turn the protect function OFF by accessing MENU 3-01, reenter the PLAY mode and perform write operations again. Also, if the COMPARE/RECALL function is ON, writing will be impossible.

Note that writing to the operation memory must be performed in the PLAY sub-mode.

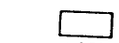


To edit sound and effect data you've already written, preset sounds or sounds from RAM or ROM cards

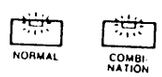
You must first move the sounds of the selected Operation Memory back to the COMBINATION or NORMAL MODE memory.

①While in the Operation Memory mode, select the patch that you wish to edit.

②Hold down the WRITE key and press the "Combination" or "Normal" mode.



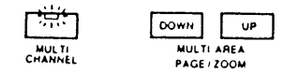
This will write the Operation back into the combination buffer so you can access all of the functions (except for menu 2-00 and 10) to re-edit your combination or normal sound - months or even years after you originally created it!



③When you've finished editing the sound, re-write it using normal write operations.

Performance/Editing in the Multi Channel Mode

The Multi channel mode can be used to receive or send through up to 8 MIDI channels.
This MULTI CHANNEL mode differs from the normal MIDI Performance MODEs (MIDI mode 4 (OMNI/OFF, MONO), etc.).



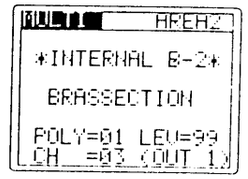
KEY ASSIGN CONFIGURATIONS

( ) .... polyphonic

DISPLAY \ OUT	MIX OUTPUT	LINE OUT		HEADPHONES	
		1	2	L	R
AREA 1~8	AREA 1~4 (8) AREA 5~8 (8)	AREA 1~4 (8)	AREA 5~8 (8)	AREA 1~4 (8)	AREA 5~8 (8)

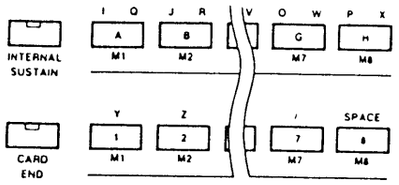
To assign a patch to a specific AREA

①After entering the Multi Channel mode by pressing the Multi Channel key, specify the AREA in which you want to assign a patch by pressing the MULTI AREA keys (right or left).



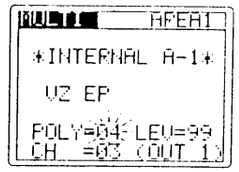
②Specify the patch to be assigned by pressing the INTERNAL or CARD key and the voice BANK and NUMBER selectors.

If 2 or more CARD patches are selected in any conbined sound, the second and succeeding card patches will not sound immediately even though they appear on the display. To "write" them into the AREA sounds, you must press the Multi Channel key once again, after selecting all patches you want in the sound with MIDI function.

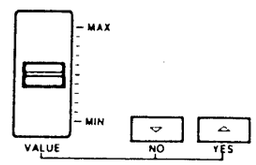


To specify polyphony for a specific AREA

①After entering the Multi Channel mode by pressing the Multi Channel key, specify the AREA in which you want to specify polyphony by pressing the MULTI AREA keys (right or left). Note that the cursor flashes on the POLY position.

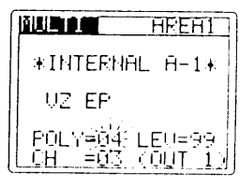


②Specify polyphony for the selected AREA with the value controls. (Note that if this value does not change, you may have to lower the polyphony level for another area, as the maximum sum polyphony totals 8 notes for AREA 1~4 or AREA 5~8.)

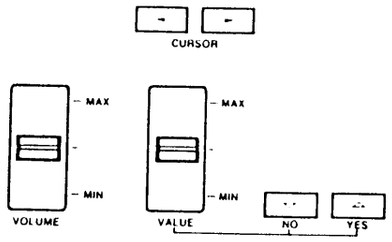


To alter volume level for a specific AREA

①After entering the Multi Channel mode by pressing the Multi Channel key, specify the AREA for which you want to alter the output volume level by pressing the MULTI AREA keys (right or left). Note that the cursor flashes on the POLY position.



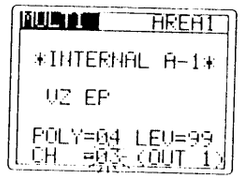
②Move the cursor to the LEV (level) position and lower or raise the relative volume level with the value controls. (Note that at a maximum level of "99," the volume is equal to that as controlled with the master volume on the front panel.)



To specify a MIDI channel for a specific AREA

①After entering the Multi Channel mode by pressing the Multi Channel key, specify the AREA for which you want to set the MIDI channel number by pressing the MULTI AREA keys (right or left). Note that the cursor flashes on the POLY position.

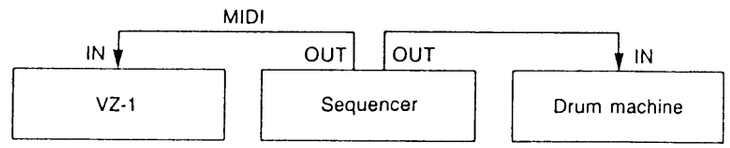
②Move the cursor to the CH (MIDI Channel) position and specify the MIDI channel with the value controls.



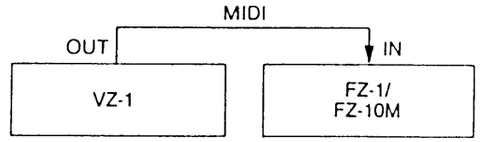
Note that these settings are made for each AREA individually. You can change the selected AREA number at any point in editing by pressing the Multi Area keys.

MIDI - Musical Instrument Digital Interface

The VZ-1 is equipped with MIDI - the Musical Instrument Digital Interface. This is an industry-standard interface that allows you to connect the VZ-1 to other MIDI-equipped electronic musical instruments, drum and rhythm machines, sequencers, and even personal computers.



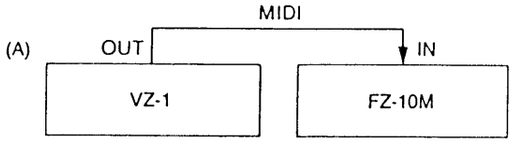
The VZ-1 can be connected to other instruments in a variety of configurations. For example, you can take advantage of advanced sampling capabilties by connecting the VZ-1 to a Casio FZ-1/FZ-10M Digital Sampling Synthesizer.



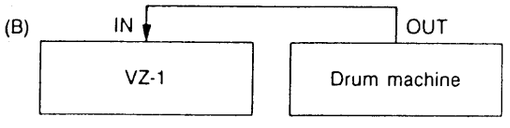
On the VZ-1, MIDI-related settings are made using the MIDI CHANNEL and MIDI DATA functions found in MENU 3 (MENU 3-03 and MENU 3-04.) For details on how to set MIDI-related parameters, refer to the corresponding function indexes.

Examples of MIDI Application

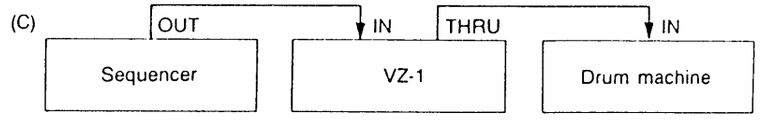
①In configuration A, the VZ-1 can be used as a master keyboard to control another MIDI sound source (such as the FZ-10M). You can use the VZ-1 keyboard to control only FZ-10M sounds, or play sounds from both sound sources in synch.



②In configuration B, the VZ-1 can be used as a slave, being driven by another MIDI device such as a drum machine.



③In a MIDI chain setup, such as configuration C, multiple MIDI devices can be controlled by a master controller such as a master keyboard, sequencer or even a personal computer.



STANDARD COMMUNICATION DATA

MODE / NIDI MESSAGES	OP. MEM		NORMAL		COMBI		MUL. CH	
	SEND	RECEIVE	SEND	RECEIVE	SEND	RECEIVE	SEND	RECEIVE
Key pitch, Note ON/OFF, Velocity	○	○	○	○	○	○	○	○
After touch	○	○	○	○	○	○	○	○
Ritch bend	○	○	○	○	○	○	○	○
Definable wheel 1	○	○	○	○	○	○	○	○
Definable wheel 2	○	○	○	○	○	○	○	○
Foot VR	○	○	○	○	○	○	○	○
Main volume	○	○	○	○	○	○	○	○
Portamento time		○		○		○		○
Portamento ON/OFF		○		○		○		○
Sustain pedal	○	○	○	○	○	○	○	○
Bend range		○		○		○		○
Program change	○	○	○	○	○	○	○	○
Local control ON/OFF		○		○		○		○
Mono mode		○		○		○		○
Poly mode		○		○		○		○

SYSTEM EXCLUSIVE MESSAGES

MODES / MESSAGES	OP. MEM		NORMAL		COMBI		MUL. CH	
	SEND	RECEIVE	SEND	RECEIVE	SEND	RECEIVE	SEND	RECEIVE
Patch data (*1)		○	○	○	○	○		○
Operation data (*2)	○	○						
Multi channel mode data (*3)	○	○	○	○	○	○	○	○
Save/Load data (64 sounds, 64 operation memories)	○	○	○	○	○	○	○	○
Master tuning data		○		○		○		○
Transpose data		○		○		○		○
Mode change data		○		○		○		○
Card bank change data	○	○	○	○	○	○	○	○
Bend range data		○		○		○		○
System Exclusive END	○	○	○	○	○	○	○	○

Transmission of above-listed SYSTEM EXCLUSIVE MESSAGES data enabled only when MENU 3-04 EXCLUSIVE parameter is set to "ENA".

*1: When a single sound is transmitted in the NORMAL or COMBI play sub-modes, the sound is specified by pressing the A-H and 1-8 keys, afterwhich it is transmitted to the Compare/Recall memory area of the receiving VZ-1.

*2: When single operation data is transmitted, the operation is specified by pressing the A-H and 1-8 keys, afterwhich it is transmitted to either the NORMAL (1 patch) or COMBI (combined sounds) working areas of the receiving VZ-1.

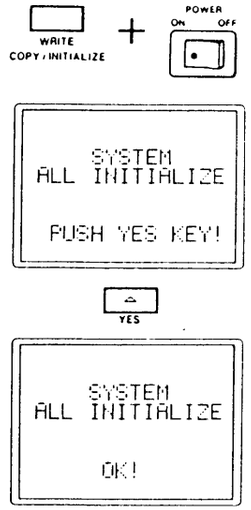
*3: When multi channel mode data is transmitted, the data is specified by pressing the multi channel mode key.

Initializing the VZ-1

The VZ-1 can be "initialized" in a number of ways, allowing you to reset the entire keyboard to its initial factory settings or initialize only the data of a specific MODE or FUNCTION, for example. The following describes the various VZ-1 initializing procedures.

SYSTEM ALL INITIALIZE

To initialize **all VZ-1** internal operation memory, voice and effect data to factory preset values, hold down the WRITE key and turn VZ-1 power ON. Respond to the YES? prompt by pressing the YES key. All internal data is reset to its original state as listed on page 99.



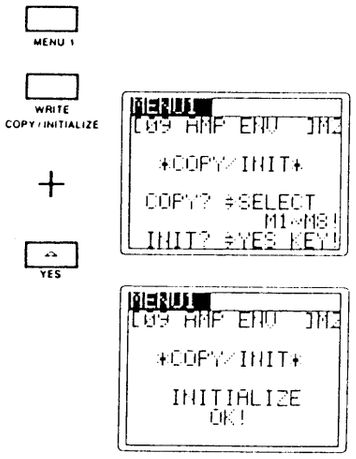
INITIALIZING MENU 1 FUNCTIONS

To initialize **all parameters** in any **single** MENU 1 function for a selected MODULE, simply press the MENU 1 key and use the value controls to select the desired function. Then hold down the WRITE (COPY/INITIALIZE) key and respond to the prompt by pressing the YES key.
The values of all parameters in the selected function are then reset to their initialized state (see page 100). Parameter values in other functions, however, remain unaffected.

MENU 1-00 LINE (M1M2-M7M8)
When this parameter is initialized, LINE DATA of all modules (M1-M8) are initialized automatically.

MENU 1-09 ENVELOPE (DCA)
When this parameter is initialized, the data of not only MENU 1-09 but AMP ENV in MENU 1-17 is automatically initialized.

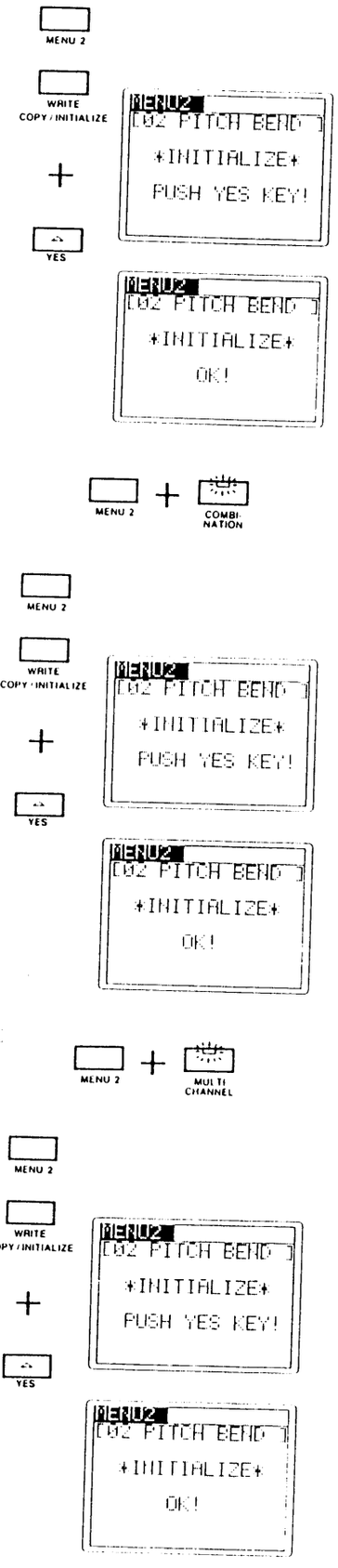
MENU 1-03 ENVELOPE (DCO)
When this parameter is initialized, the data of not only MENU 1-03 but PITCH ENV in MENU 1-17 is automatically initialized.



INITIALIZING MENU 2 NORMAL MODE FUNCTIONS (01 - 06)

To initialize parameter data in MENU 2 functions 01 through 06 simultaneously, hold down the NORMAL key while pressing the MENU 2 key. Parameter values and settings will be reset to initialized values as shown on page 99.

To initialize functions 01 through 06 **individually**, press the MENU 2 key and use the value controls to select the desired function. Then hold down the WRITE (COPY/INITIALIZE) key and respond to the prompt by pressing the YES key. Parameter values and settings will be reset to initialized values as shown on page 99.



INITIALIZING MENU 2 COMBINATION MODE FUNCTIONS (01-17)

To initialize **all** MENU 2 parameter data (01-17) for patches 1 through 4 in a combined sound, hold down the MENU 2 key and press the COMBINATION key. Parameter values and settings will be reset to initialized values as shown on page 99.

To initialize functions 01 through 17 **individually**, press the MENU 2 key and use the value controls to select the desired function. Then hold down the WRITE (COPY/INITIALIZE) key and respond to the prompt by pressing the YES key. Parameter values and settings will be reset to initialized values as shown on page 99.

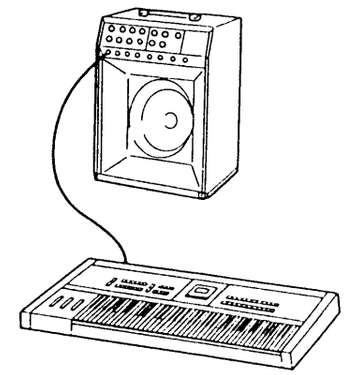
INITIALIZING MENU 2 MULTI CHANNEL MODE FUNCTIONS (01-06, 18)

To initialize **all** related MENU 2 parameter data (01-06 and 18) for AREAs 1 through 8 in a multi-channel sound in the MULTI CHANNEL mode, hold down the MENU 2 key and press the MULTI CHANNEL key. Parameter values and settings will be reset to initialized values as shown on page 99.

To initialize functions 01 through 06 and 18 **individually**, press the MENU 2 key and use the value controls to select the desired function. Then hold down the WRITE (COPY/INITIALIZE) key and respond to the prompt by pressing the YES key. Parameter values and settings will be reset to initialized values as shown on page 99.

VZ-1 Sound Seminar: The elements of sound synthesis

As a "sound synthesizer," your VZ-1 is a device used to create "sounds". You probably use this word - sound - quite frequently, but did you ever actually think about nature of "sound" - what it is and how it is generated? Before diving into VZ-1 operations, you may want to read through this section carefully - after all, there's no point in studying how to operate a tool without first understanding what it was designed to do!



SOUND: A product of air?

Each day, we hear a great variety of sounds - music, human voices, raindrops - even our own footsteps. In other words, we live our lives literally surrounded by sound. Naturally, we can't see sound - so how can we describe it?

Technically speaking, sound is the sensation that we experience when movement or vibrations in the air are detected by our ears.

As a practical example, let's see how the "sound" of a bell is produced, and how it is sensed by our ears.

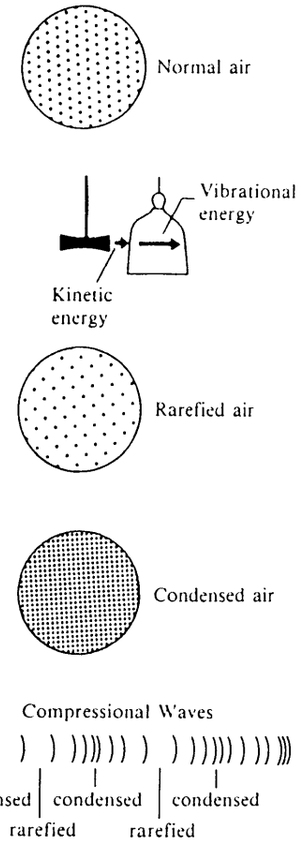
If we were to examine a mass of air where no sound is being carried, we would find that air particle density is relatively uniform. Naturally, there would be some movement of air particles, but there wouldn't be enough to generate an audible "sound". For this example, we will strike a bell with a hammer, in such a "sound-free" environment.

When kinetic (motive) energy is applied to a bell with a hammer, the bell surface is temporarily "deformed" - in other words, the shape of the bell structure is temporarily changed. Energy then goes to work to restore the bell to its original shape - this is called vibration. When the bell surface vibrates, two different - but interrelated - phenomena occur.

When the surface of the bell is "stretched in" (as bell is struck), random air particles surrounding the bell suddenly occupy a much larger air space than normal - in other words, the air suddenly becomes less dense immediately around the bell's surface. This is known as "**rarefaction**." In simple terms, **rarefied** air is air with low atmospheric pressure, or less density than the surrounding air mass.

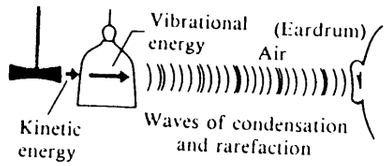
Immediately after the bell's surface is "stretched" by the hammer, the tension of the bell's surface causes it to spring outwards. This causes the same air particles which were just rarefied to become **compressed**. In simple terms, the air mass around the bell which was low in atmospheric pressure suddenly becomes high in atmospheric pressure.

The surface of the bell will then continue to oscillate back and forth until it settles back into its original shape.



As you might imagine, the cyclical changes in air pressure caused by the oscillation of the bell's surface produced what are known as "**compressional waves**." These waves of air pressure cause our eardrums to vibrate, and nerves in the inner ear translate these vibrations into "sound."

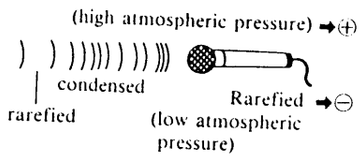
Naturally, the type of vibration produced is dependent on a great number of factors - as the vibrating body differs so will the vibrations, and so will the sound.

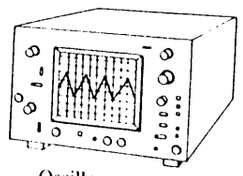


Seeing Sounds With Our Eyes: Waveforms

As we discussed in the introduction to this sound seminar, sounds cannot actually be seen with the human eye. However you've probably heard such expressions as "the waveform is different" "this is almost a pure sine wave," with regards to sound. But what exactly is meant by these terms - waveform and wave - and how can they be observed?

For a moment, let's consider how a microphone works. As you probably already know, a microphone converts compressional waves into electrical signals, which can then be transmitted to an amplifier and speakers for output as sound. As shown in the illustration, these electrical signals are simple conversions of compressional waves - with condensed air being output as positive (+) electrical charges and rarefied air being output as negative (−) charges. The **compressional waves** of air are, then, transformed into electrical "waves", which can be viewed on electronic devices such as **oscilloscopes**. These waves are cyclical, and their form over time produces a visible shape or form which is called - you guessed it, a **waveform**.



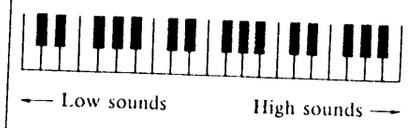

Oscilloscope

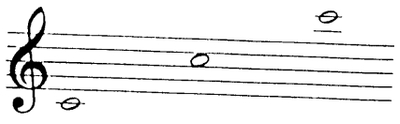
The Three Basic Elements of Sound

When we hear an individual sound, it can be defined by considering three different parameters; **Pitch**, **Timbre** and **Amplitude** (loudness).

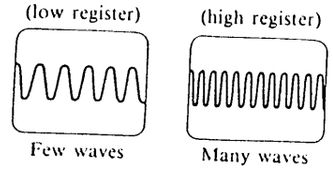
ELEMENT 1: PITCH

Pitch is the quality of a sound which makes it seem higher or lower than other sounds. For example, the notes at the top or right-hand end of a keyboard are "higher in pitch" than those at the left-hand end.
The pitch of a note is determined by the rate at which vibrations are set up in the air particles - i.e. the rate at which cyclical compression and rarefaction takes place.

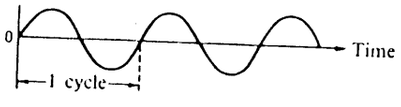




If we convert sounds into electrical signals and look at them on an oscilloscope, we can see that the number of waves per time unit differ between "high-pitched" and "low-pitched" sounds.



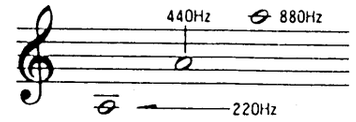
For a moment, let's go back to our bell example. As the bell produces compressions and rarefactions at a fixed rate, waves of particle vibrations are generated in the air surrounding the bell. These waves move away from the fork at a fixed rate - the speed of sound. As waves move away from our sound source (the bell) at a fixed rate, the length of each wave depends on the rate at which the bell's surface vibrates. A single cycle of a sine wave is shown on the right.



The distance that a wave covers in the time it takes to complete one cycle is known as the "**wavelength**," while the number of cycles that are made each second is known as the "**frequency**."

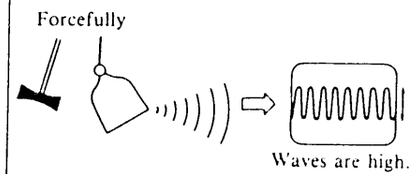
How does all this relate to pitch? Very simple - **the higher the frequency of a sound, the higher the pitch**. A low frequency sound will have a long waveform and a low pitch, while a high frequency sound will have a shorter waveform and a higher pitch. In the world of science (and music!), frequency is measured in units called "Hertz" (Hz). For example, 100Hz indicates that vibrations occur at the frequency of 100 times per second. Also, it's interesting to note that doubling the frequency of a sound will raise it by one octave.

Well, that explains the length and speed of our "wave", but what about its height? Aha! The next element of sound - amplitude....

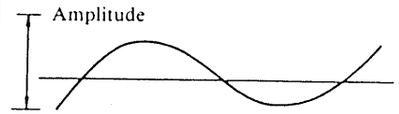


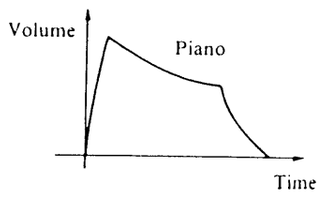
ELEMENT 2: Amplitude

Compared with pitch, amplitude (loudness) is very easy to understand. If we consider the sine wave produced by our bell again, the harder the bell is hit by the hammer, the larger the bell vibrations and the more the air particles are compressed and rarefied. As a result, the peaks and troughs of the sound wave will be larger, and our ears will detect that the sound being produced is much louder. The vertical "height" of the wave, or the distance from the top of a peak to the bottom of a trough in a single cycle is known as **amplitude**. Simply speaking, we perceive amplitude as loudness - **the higher the amplitude, the louder the sound.**

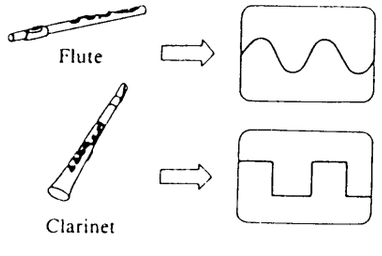


When we consider the loudness of a sound, the dynamics (changes in loudness) are a vital aspect. For example, listen to the sound produced by playing a single note on a piano. As the hammer strikes the strings (**attack**), the output of the piano rises from total silence to a maximum level almost instantly. The sound then starts to die away, or "**decay**", as the vibration of the strings is damped by the surrounding air. When you release the key, the piano dampers deaden the string vibration and the note dies away relatively quickly.
Note that all through this process, the loudness, or amplitude, has been changing. If we were to view these changes in volume over time graphically, we could see that amplitude takes a "shape" over time. This "shape" is known as the note's **amplitude envelope**.





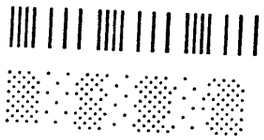
But even if you play, for example, a flute and a clarinet at the exactly the same pitch and at exactly the same volume level, you won't hear the same sound.
Which brings us to the third element of sound - **timbre**.



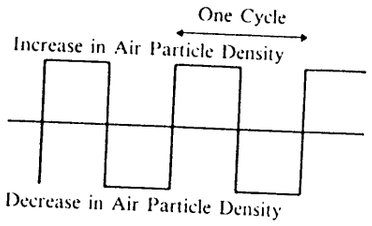
ELEMENT 3: Timbre

Timbre is the quality of a sound that enables us to distinguish the sound from another of the same pitch. If we look once again at the waveform produced by our bell, it's easy to see that the shape of the waveform is determined by the compressions and rarefactions of air produced by the bell's vibration.

Now look at the particles shown on the right.
As you can see, the source of the sound is such that the particles are compressed to a certain pressure for a fixed period of time and then rarefied for an equal period.



If we view this graphically, the resulting waveform is "square". This is, of course, what is known as a "square wave".



Remember though, that the square wave still travels at the same speed as our sine wave, so, if it is of the same wavelength, our ears will interpret its pitch as being the same. But because the air particles are vibrating in a different way, we will hear the sound as an entirely different "**timbre**".

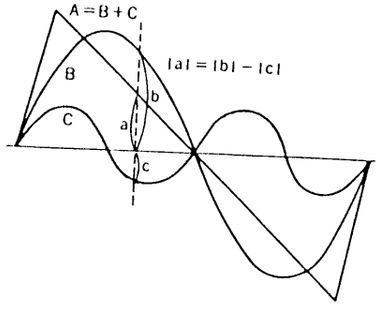
Very basically, we can divide waveforms into three types, shown below.

WAVEFORM	TYPE	TIMBRE	INSTRUMENTS
	Sine wave	Soft	Flute, whistle
	Saw-tooth wave	Bright	Violin, trumpet
	Square wave	Simple	Clarinet, oboe

The VZ-1 offers a total of 8 different waveforms. You'll become extremely familiar with the characteristics of each as you use the VZ-1.

Fundamental Waves and Harmonics - Shaping the Timbre

Now that you have a basic idea of what sound is and how it is generated, you would probably like to know how you can determine the **shape of a wave** (= timbre) in order to create the kind of sound you want.
First, take a look at this diagram.



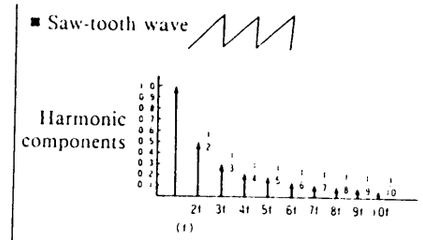
This figure illustrates the process of combining two sine waves in order to form a saw-tooth wave. B is the basic sine wave, while C is a wave which is oscillating at twice the frequency of B (making it one octave higher in pitch), and at only half the amplitude (volume) of B.

When we combine B and C, the result is waveform A. A is still not a perfect saw-tooth wave, but it will gradually approach a perfect saw-tooth shape as additional sine waves at 1/3, 1/4, 1/5, etc. the level of the fundamental wave are added.

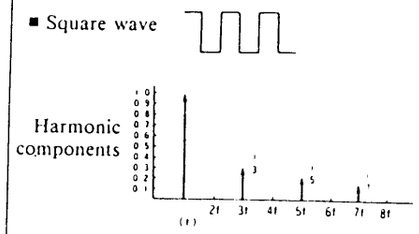
In this manner, any waveform can be created by adding a number of sine waves to a basic sine wave. Waves such as C with frequencies that are integral multiples of the frequency of the fundamental wave are known as "**harmonics**."

The waveform, and thus the timbre are actually determined by the kind of harmonics added to the basic sine wave. In simple terms, almost all sounds with their different timbres that reach our ears include a variety of different harmonics, and it is these harmonics which are responsible for the countless characteristic timbres.

■ Saw-tooth wave



■ Square wave



•Graphs such as the ones above which show the harmonic components of a wave form are called "harmonic spectrums".

ENVELOPES: Sound over time

The word "envelope" may be new to you - but it's an extremely important term in understanding sound, and especially important in sound synthesis.
Literally speaking, an "envelope" is a voltage that changes as a function of time. In the VZ-1, envelopes are used to shape both the amplitude, pitch and timbre of a sound over time.

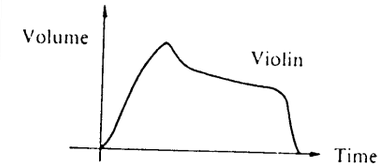
To understand envelopes more clearly, think of the sound of a violin. When the violinist bows a string, the volume, pitch and even timbre change slightly over time. If there were no changes over time, the sound would have no beginning, no pitch variance, and no end!

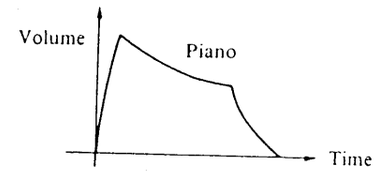
Think now of a piano. If a piano note were to sound continuously without decaying, it would be very difficult to distinguish it from the sound of a flute.

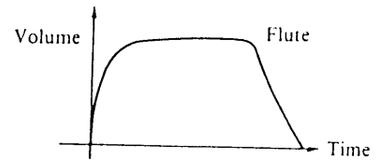
Envelopes, then, are what determine the overall "shape" of the sound over time - including the variations in pitch, volume and timbre.

The VZ-1 lets you create envelope contours in up to 8 steps by making **RATE** and **LEVEL** specifications at up to 8 points in the envelope.

Envelope Curves of Various Instruments (Sound Volume)

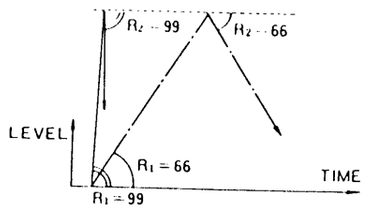






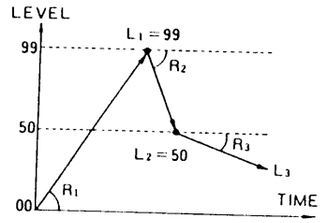
RATE

The RATE indicates the slope (interior angle in relation to horizontal axis) of each step in the envelope. A RATE value of "99" indicates a slope of nearly 90°, while a RATE value of "0" indicates nearly 0°. Since the value used is an absolute value, the slope increases and decreases in direct proportion with the RATE value, regarless of whether the pattern shows a rise or fall. This means that a steep incline results in a quick level change, while a gentle incline results in a slow level change.



LEVEL

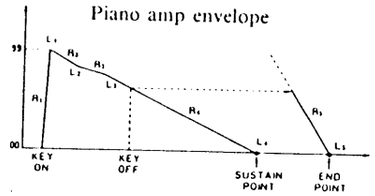
The LEVEL parameter indicates up to what point the envelope rises or falls at each step. For the DCO envelope, LEVEL means pitch height, while for the DCA envelope, LEVEL is equal to the amplitude (volume) level.



How RATEs and LEVELs Interact

To understand the relationship between RATEs and LEVELs, take a close look at a typical amplitude envelope shown on the right.

Piano amp envelope



Musical Sounds vs. Noise

Depending on the type of characteristic vibrations it is based on, a sound may be classified as being either "musical" or "noise". Sounds with regular cyclical vibrations (i.e. sound in which components other than harmonics are very few) are considered to be **musical**, while sounds caused by complicated irregular vibrations (i.e. sounds with many components that are not harmonics) whose pitch can therefore not be measured are classified as **noise**.

SYSTEM INITIALIZED DATA

Mode	OPERATION MEMORY	
Internal	64 PRESET TONES 64 OPERATION MEMORIES	
Compare/Recall etc.	preset voice A-1	
MENU2	↓ see the chart below	
MULTI CHANNEL Mode	↓ see the chart below	
MENU3	00 TUNE/TRANSP	442Hz/C
	01 MEM PROTECT	INT=ON, CARD=ON
	02 SAVE/LOAD	SAVE, CARD, VC+OP
	03 MIDI CH	RECEIVE=01, SEND=01
	04 MIDI DATA	PROG No.=0~127
		EXCLUSIVE=DIS
		CONT No.=OFF
		VOLUME IN=ENA
	05 PITCH BEND	TOTAL BEND=OFF
		RANGE=12
		RELEASE=ENA

MENU2 INITIALIZED DATA

	Effects		Modes: NORMAL	COMBI-NATION VOICE1~4	MULTI CHANNEL AREA1~8
01	PORTM TIME	00~99	00		
	PORTM MODE	0, 1	0		
	SOLO	ON/OFF	OFF		
02	BEND RANGE	00~48	02		
	RELEASE	ENA/DIS	ENA		
03 ~ 06	SENSITIVITY	00~99	03: AFTER TOUCH is 20, others are 50		
	VIB DEPTH	ON/OFF	OFF		
	VIB RATE	ON/OFF	OFF		
	PITCH	+ON, -ON, OFF	OFF		
	PORTM TIME	ON/OFF	OFF		
	TREM DEPTH	ON/OFF	OFF		
	TREM RATE	ON/OFF	OFF		
	A ENV BIAS	ON/OFF	OFF		
07	LEVEL	00~99	99		
08	POLARITY	+, −	+		
	OCTAVE	0~5	0		
	NOTE	00~11	00		
	FINE	00~63	00		
09	SP POINT	C0~B8	B3		
	LOWER	C0~B♭8	E3		
	MIDDLE	C=0~B8	A♭4		
	UPPER	D0~C9	C6		

	Effects		Modes: NORMAL	COMBI-NATION VOICE1~4	MULTI CHANNEL AREA1~8
10	SUSTAIN	ENA/DIS		ENA	
11	VEL SP RANGE (from)	001~127		001	
	VEL SP RANGE (to)	001~127		127	
12	VEL INVERSE	ON/OFF		OFF	
13	EFFECT	ON/OFF		OFF	
	POS (from)	C0~B8		C3	
	POS (to)	C=0~C9		F5	
	L POS (from)	C0~G8		B♭2	
	L POS (to)	C=0~A♭8		F=3	
	M POS (from)	D0~A8		D♭4	
	M POS (to)	E♭0~B♭8		A4	
	U POS (from)	E0~B8		F5	
	U POS (to)	F0~C9		D♭6	
14	DELAY TRIG	00~99		00	
15	VIBRATO INVERSE	ON/OFF		OFF	
16	TREMOLO INVERSE	ON/OFF		OFF	
18	POLARITY	+, −			+
	OCTAVE	0~5			0
	NOTE	00~11			00
	FINE	00~63			00

• When initialization is carried out in the Multi Channel mode using MENU2 key and MULTI CHANNEL key, play mode data for VOICE No., POLY, LEV, CH are also intialized.

INITIALIZED PARAMETER DATA

VOICE No.	—	VOICE NAME		OCTAVE	0	TOTAL LEV	99

	M1M2	M3M4	M5M6	M7M8
INT LINE	MIX	MIX	MIX	MIX
EXT PHASE	／	OFF	OFF	OFF

	WAVE	DEPTH	RATE	DELAY	MULTI
VIBRATO	1	00	75	00	OFF
TREMOLO	1	00	75	00	OFF

	WAVE FORM	DETUNE		ENVELOPE/VEL RATE	STEP	1	2	3	4	5	6	7	8	ENV DEPTH		KEY FOLLOW	POINT	1	2	3	4	5	6	VELOCITY		AMP SENS
M1	1	FIX	OFF		RATE	99	50	50	50	50	50	50	50	DEPTH	99		KEY	C2	F4	C7	A7	E8	C9	SENS	00	0
		HARM	1		LEV	99	00	00	00	00	00	00	00													
		POL(XR)	+		SS/ED	SS							ED	MOD ON/OFF	ON		LEV	99	99	99	99	99	99	CURVE	1	
		OCT	0		E/*	*	*	*	*	*	*	*	*													
		NOTE	00																							
		FINE	00																							
M2	1	FIX	OFF		RATE	99	50	50	50	50	50	50	50	DEPTH	99		KEY	C2	F4	C7	A7	E8	C9	SENS	00	0
		HARM	1		LEV	99	00	00	00	00	00	00	00													
		POL(XR)	+		SS/ED	SS							ED	MOD ON/OFF	ON		LEV	99	99	99	99	99	99	CURVE	1	
		OCT	0		E/*	*	*	*	*	*	*	*	*													
		NOTE	00																							
		FINE	00																							
M3	1	FIX	OFF		RATE	99	50	50	50	50	50	50	50	DEPTH	99		KEY	C2	F4	C7	A7	E8	C9	SENS	00	0
		HARM	1		LEV	99	00	00	00	00	00	00	00													
		POL(XR)	+		SS/ED	SS							ED	MOD ON/OFF	ON		LEV	99	99	99	99	99	99	CURVE	1	
		OCT	0		E/*	*	*	*	*	*	*	*	*													
		NOTE	00																							
		FINE	00																							
M4	1	FIX	OFF		RATE	99	50	50	50	50	50	50	50	DEPTH	99		KEY	C2	F4	C7	A7	E8	C9	SENS	00	0
		HARM	1		LEV	99	00	00	00	00	00	00	00													
		POL(XR)	+		SS/ED	SS							ED	MOD ON/OFF	ON		LEV	99	99	99	99	99	99	CURVE	1	
		OCT	0		E/*	*	*	*	*	*	*	*	*													
		NOTE	00																							
		FINE	00																							
M5	1	FIX	OFF		RATE	99	50	50	50	50	50	50	50	DEPTH	99		KEY	C2	F4	C7	A7	E8	C9	SENS	00	0
		HARM	1		LEV	99	00	00	00	00	00	00	00													
		POL(XR)	+		SS/ED	SS							ED	MOD ON/OFF	ON		LEV	99	99	99	99	99	99	CURVE	1	
		OCT	0		E/*	*	*	*	*	*	*	*	*													
		NOTE	00																							
		FINE	00																							
M6	1	FIX	OFF		RATE	99	50	50	50	50	50	50	50	DEPTH	99		KEY	C2	F4	C7	A7	E8	C9	SENS	00	0
		HARM	1		LEV	99	00	00	00	00	00	00	00													
		POL(XR)	+		SS/ED	SS							ED	MOD ON/OFF	ON		LEV	99	99	99	99	99	99	CURVE	1	
		OCT	0		E/*	*	*	*	*	*	*	*	*													
		NOTE	00																							
		FINE	00																							
M7	1	FIX	OFF		RATE	99	50	50	50	50	50	50	50	DEPTH	99		KEY	C2	F4	C7	A7	E8	C9	SENS	00	0
		HARM	1		LEV	99	00	00	00	00	00	00	00													
		POL(XR)	+		SS/ED	SS							ED	MOD ON/OFF	ON		LEV	99	99	99	99	99	99	CURVE	1	
		OCT	0		E/*	*	*	*	*	*	*	*	*													
		NOTE	00																							
		FINE	00																							
M8	1	FIX	OFF		RATE	99	50	50	50	50	50	50	50	DEPTH	99		KEY	C2	F4	C7	A7	E8	C9	SENS	00	0
		HARM	1		LEV	99	00	00	00	00	00	00	00													
		POL(XR)	+		SS/ED	SS							ED	MOD ON/OFF	ON		LEV	99	99	99	99	99	99	CURVE	1	
		OCT	0		E/*	*	*	*	*	*	*	*	*													
		NOTE	00																							
		FINE	00																							
PITCH					RATE	50	50	50	50	50	50	50	50	RANGE	NARROW		KEY	C2	F4	C7	A7	E8	C9	SENS	00	
					LEV	00	00	00	00	00	00	00	00													
					SS/ED	SS							ED	DEPTH	63		LEV	63	63	63	63	63	63	CURVE	1	
					E/*	*	*	*	*	*	*	*	*													
PITCH /AMP																	KEY	C2	F4	C7	A7	E8	C9	SENS	00	
																	RATE	+00	+00	+00	+00	+00	+00	CURVE	1	

*H-8 in BANK 2 features initialized internal voices. You can access all initialized sound data by selecting this voice number on the ROM card.

VOICE No.		VOICE NAME		OCTAVE		TOTAL LEV	

	M1M2	M3M4	M5M6	M7M8
INT LINE				
EXT PHASE				

	WAVE	DEPTH	RATE	DELAY	MULTI
VIBRATO					
TREMOLO					

	WAVE FORM	DETUNE	ENVELOPE/VEL RATE STEP	1	2	3	4	5	6	7	8	ENV DEPTH	KEY FOLLOW POINT	1	2	3	4	5	6	VELOCITY	AMP SENS
M1		FIX	RATE									DEPTH	KEY							SENS	
		HARM	LEV																		
		POL(xR)	SS/ED									MOD ON/OFF	LEV							CURVE	
		OCT	E/*																		
		NOTE																			
		FINE																			
M2		FIX	RATE									DEPTH	KEY							SENS	
		HARM	LEV																		
		POL(xR)	SS/ED									MOD ON/OFF	LEV							CURVE	
		OCT	E/*																		
		NOTE																			
		FINE																			
M3		FIX	RATE									DEPTH	KEY							SENS	
		HARM	LEV																		
		POL(xR)	SS/ED									MOD ON/OFF	LEV							CURVE	
		OCT	E/*																		
		NOTE																			
		FINE																			
M4		FIX	RATE									DEPTH	KEY							SENS	
		HARM	LEV																		
		POL(xR)	SS/ED									MOD ON/OFF	LEV							CURVE	
		OCT	E/*																		
		NOTE																			
		FINE																			
M5		FIX	RATE									DEPTH	KEY							SENS	
		HARM	LEV																		
		POL(xR)	SS/ED									MOD ON/OFF	LEV							CURVE	
		OCT	E/*																		
		NOTE																			
		FINE																			
M6		FIX	RATE									DEPTH	KEY							SENS	
		HARM	LEV																		
		POL(xR)	SS/ED									MOD ON/OFF	LEV							CURVE	
		OCT	E/*																		
		NOTE																			
		FINE																			
M7		FIX	RATE									DEPTH	KEY							SENS	
		HARM	LEV																		
		POL(xR)	SS/ED									MOD ON/OFF	LEV							CURVE	
		OCT	E/*																		
		NOTE																			
		FINE																			
M8		FIX	RATE									DEPTH	KEY							SENS	
		HARM	LEV																		
		POL(xR)	SS/ED									MOD ON/OFF	LEV							CURVE	
		OCT	E/*																		
		NOTE																			
		FINE																			
PITCH			RATE									RANGE	KEY							SENS	
			LEV																		
			SS/ED									DEPTH	LEV							CURVE	
			E/*																		
PITCH /AMP													KEY							SENS	
													RATE							CURVE	

OPERATION No.		OPERATION NAME		KEY ASSIGN	
1 VOICE No. / NAME		2 VOICE No. / NAME		3 VOICE No. / NAME		4 VOICE No. / NAME	

		1	2	3	4
RORTAMENTO /SOLO	PORTM TIME				
	PORTM MODE				
	SOLO				
PITCH BEND	BEND RANGE				
	RELEASE				
COMBI LEVEL	LEVEL				
COMBI PITCH	POLARITY				
	OCTAVE				
	NOTE				
	FINE				
SPLIT POINT	SP POINT				
	LOWER SP				
	MIDDLE SP				
	UPPER SP				
SUS PEDAL	SUSTAIN				
VEL SPLIT	RANGE(FROM)				
	RANGE(TO)				
VEL INV	INVERSE				
POS X-FADE	EFFECT				
	POS (FROM)				
	POS (TO)				
	L POS (FROM)				
	L POS (TO)				
	M POS (FROM)				
	M POS (TO)				
	U POS (FROM)				
	U POS (TO)				
DELAY TRIG	DELAY				
VIBRATO INV	INVERSE				
TREMOLO INV	INVERSE				

		1	2	3	4
AFTER TOUCH	SENSITIVITY				
	VIB DEPTH				
	VIB RATE				
	PITCH				
	PORTM TIME				
	TREM DEPTH				
	TREM RATE				
	A ENV BIAS				
DEF WHEEL 1	SENSITIVITY				
	VIB DEPTH				
	VIB RATE				
	PITCH				
	PORTM TIME				
	TREM DEPTH				
	TREM RATE				
	A ENV BIAS				
DEF WHEEL 2	SENSITIVITY				
	VIB DEPTH				
	VIB RATE				
	PITCH				
	PORTM TIME				
	TREM DEPTH				
	TREM RATE				
	A ENV BIAS				
FOOT VR	SENSITIVITY				
	VIB DEPTH				
	VIB RATE				
	PITCH				
	PORTM TIME				
	TREM DEPTH				
	TREM RATE				
	A ENV BIAS				

OPERATION MEMORY NAMES (PRESET/ROM CARD)

See page 90 for "SYSTEM ALL INITIALIZE"

PRESET

	A	B	C	D	E	F	G	H
1	SEE GOD	SOFT ORCHEST	VZ EP	VIOLINT ATCK	GITIANO	CC LEAD	HEAVY SPLIT	ORCH SPLIT F
2	SEE GOD 2	MELLOW PAD	AMBIENT EP	HORN/STRINGS	VZ VIBES	YES I GOT	FUNKY TOWN	ORCH SPLIT P
3	VIB/STR SOFT	PEACE TREATY	VZ PIANO	STRONG ORCH	WARM ORGAN	VZ SOLO LEAD	MELLOW SPLIT	NEWAGE POS-X
4	ICE AGE	EP-CINEMA	AMBIENT EP 2	SYNTH ORCH	SLAP BASS	VZ PERC PAD	STRING/FLUTE	SERENE AGE
5	BRASS CHORUS	EP-SERENE	EPHONE	BRASS QUART 2	PICK BASS	ELEC FLUTE	ETHVELOSPLIT	BEAUTY/BEAST
6	BRASS QUART	FOOT VIBIANO	12 STRING	BIG BLAST	FRETLESS BS	TAKE A	BASS/EP	VELOMONICA
7	COPPERFUNK	PIANO/LOCH	DOUBLEGUITAR	BRASS DETUNE	HEADBANGER	NEW RAGE	BASS/VIBES	TRUMPOCITY
8	BS/GTNO-RICH	DIGIVOICES	FESTIVE BELL	BRASS DETUN 2	HEAVY METAL	NEW RAGE 2	BS/VBNO-SRNE	HARP ROLL

ROM CARD (1)

	A	B	C	D	E	F	G	H
1	BEGINNING	POWER SPLIT	ACOUSTAR	STR ENSEMBLE	PEACEFUL	SAXY LEAD	BASS/SYNTH	VELOFLUTE
2	SOFT ORCH 2	MAX S LAIR	12 STRING 2	STR QUARTET	GEN PURPOSE	RING FLUTE	BASS/CLAVI	SAXOPHOCITY
3	ICE HORNS	FUNKATTACK	12 STRING 3	SWIRLING STR	ORIENTAL	LIVE LEAD	SUNDAY NOON	BELLSTR/ROCK
4	RICH ORCHEST	FLUTE/STRING	DYN VZ PIANO	HORN/STRNGS 2	GAMELAN BELZ	FATTY ANALOG	NICE SPLIT	PASTOR/CLAVI
5	PASTORALE	PLUCKAHORNS	AMBIENT EP 3	MASSIVE ORCH	OVERSEAS	ANALOGUE	TXTURL SPL	XFADE GTR/BS
6	VOCAL BELLS	GHOSTLYVOICE	TOY PIANO	BIG STRINGS	RECORDERS	FAT SYNCLEAD	TXTURL SPL 2	ETHNIC XF
7	SABBATICAL	CHAMBERGROUP	DEALY VIBES	STEREO BRASS	PIPEONMONDAY	VANUGENT 5TH	RADIOCITYMAX	SOUND OF FUN
8	TWINKY	DIGIVOICES 2	OCTAVEMALLET	JAZZ BRASS	STEREO PIPE	OH NO	EASTERN SPLT	EFFECTS

ROM CARD (2)

	A	B	C	D	E	F	G	H
1	FESTIVAL	BRASS EP	BRIGHT EP	HIGH STRINGS	HARD ORGAN	WOODEN SEONC	LEAD DELAYLR	VELO PIANO
2	MELLIFLUENCE	STRINGS EP	WARM EP	STRINGS L-R	BRIDAL ORGAN	FUNK CLAVI	LEAD UNI/5TH	ST-EP VELSP
3	BELL-STRINGS	VOICE EP	MELLOW EP	STRINGS MIX	ORGAN	BACKINGGR-BR	LEAD UNISON	STARDUST VS
4	BRASS-STRMIX	CLAVI-BRASS	DREAMY EP	ORCHESTRA	MAZE	ETHNIC HARP	BASS/BRASS	ORIENT VS
5	EMERALD BLUE	HAPS-STRINGS	DIGIPIANO	BRASTRINGS	SYNTH BASS	THE NEWS	BASS/EP 2	PAVEMENT VS
6	XMAS PIANO	EXTENSION	CHORUS PIANO	BRASSMIX	TOY BASS	BELLS	DOUBLE BRASS	MAKE MAJOR
7	DIGITAL ORCH	MORNING	HONKY TONK	BRASSMIX 2	FLANGE BASS	VOICE ENS	ORGAN MIX/SP	FEINT OF HIT
8	MALTED MILK	CRYSTAL	WILD CLAVI	OVER BRASS X	BASS MIX	FEMALE VOICE	CLAVRINGS VS	SE 4 SPLIT

VOICE NAMES (PRESET/ROM CARD)

See page 90 for "SYSTEM ALL INITIALIZE"

PRESET

	A	B	C	D	E	F	G	H
1	VZ EP	R/B BRASS	VZ TRUMPET	VZ BASS	FUSION LEAD	RICH ORCH	BRASS CHORUS	VZ VIBES
2	VZ PIANO	BRASSECTION	THE SAX	BASS GUITAR	DISTORTAR FB	SERENE ORCH	SYNBRASSES	VZ VIBES 2
3	VZ PIANO 2	RESO-BRASS	VZ-MONICA	FRETLESS BS	HEAVY LEAD	DIGIVOICE	BRASS BALLS	VIBIANO
4	VZ EP 2	MELLOW BRASS	FLUTE	60S BASS	VZ PERC PAD	SPACE ORCH	PRIMALSCREAM	TOI-TOY
5	VZ EP 3	VELO ORCH	STRINGATTACK	STEEL STRING	WHINING LEAD	FLUTE JUICE	VZ TOUCH	VZ MARIMBA
6	GITIANO	VZ STRINGS	WARM ORGAN	NYLON STRING	PIPE LEAD	CRYSTAL PAD	AVANALOCH	STEEL BRUM
7	CLAVI	ORCHESTRA	COOL ORGAN	HARP	SEQ BASS	ETHEREAL	CINEMA	BELLS
8	CLAVI 2	HORN/STRINGS	PIPE SYNTH	KOTO	BASS-SYNTH	NEW RAGE	CEREMONY	BELL TREE

ROM CARD (1)

	A	B	C	D	E	F	G	H
1	DYN VZ PIANO	CZ BRASS	JAZZ SAX	ACOUSTAR	SYNTH FLUTE	PRETTY	GEN PURPOSE	TOI PERCUSS
2	VZ PIANO 3	ANALOG BRASS	JAZZ FLUTE	ACOUSTAR 2	FLUTISH LEAD	RICH ORCH 2	PLUCKED ATCK	COWBELL
3	SHARP VIBES	BRASS LICKS	RECORDER	JAZZ GUITAR	SYNC LEAD	BELL/STRINGS	PLUCKED ATK2	CHURCH BELL
4	VZ VIBES 3	FUNK BRASS	VIOLIN	KOTO 2	LIVE SYNTH	BIG ORCH	ANALOGUE	GAMELAN BELL
5	MELLOW VIBES	HORN SWELL	CELLO	VZ BASS 2	DISTORTAR	PASTORALE	DIGIVOICE 2	TRAIN/BELL
6	COOL CLAVI	ORCHESTRA 2	PIPE ORGAN	DIRTY BASS	DISTORTAR 2	TUBIANO	VOICES	CAR HORN
7	HEAVY CLAVI	PIANO/STRING	PIPE ORGAN 2	JAZZ BASS	SYNTHLEAD FB	MIDEASTMARKT	CHAMBER ENS	EXPLOSION A
8	CLAVI PIANO	SLOPHASESTR	CHURCH ORGAN	WOOD BASS	HEAVY LEAD 2	ETHNICBREATH	ETHEREAL 2	EXPLOSION B

ROM CARD (2)

	A	B	C	D	E	F	G	H
1	BRIGHT EP	BRASSMIX	OBOE-FORMIDI	FUNK BASS	GTR LEAD	FESTIVAL	ORCHESTRA 3	THE NEWS
2	WARM EP	BRASSMIX 2	CLA-FOR MIDI	PIANO BASS	GTR LEAD 2	EMERALD BLUE	BRASTRINGS	BELLS 2
3	MELLOW EP	OVER BRASS X	PAN FLUTE	EP BASS	HARMO LEAD	XMAS PIANO	CLAVI-BRASS	MUSIC BOX
4	DREAMY EP	BRASS ENS	BRIDAL ORGAN	SYNTH BASS	PERCEPTION	BELL/STRNGS 2	SOFT ENS	ETHNIC
5	DIGIPIANO	AFRO BRASS	ORGAN	DISTORTAR 3	CHORUS	MELLIFLUENCE	BREATH ATACK	TASTY MALLET
6	DIGIPIANO 2	HIGH STRINGS	ORGAN 2	BACKING GTR	ABOVE CLOUD	QUIETUDE	SYNTH PICK	SYN MARIMBA
7	WARM CLAVI	LIGHT STRING	CHURCH ORG 2	HAPSICLAVI	VOICE ENS	DELAY MIX	FEINT OF HIT	STEEL DRUM 2
8	CLAVICHORD	SYN STRINGS	MAZE	KOTO 3	MODEST VOICE	TEAR DROPS	SCRATCH	INIT VOICE

*When a ROM card is used, you can shift between ROM card banks (1) and (2) by pressing the CARD key once again. A ROM card holds up to 128 patches and 128 operation memories.

*In the Combination mode or Multi-Channel mode, up to 4 patches or up to 8 areas are separated and assigned automatically into Line Out 1 or Line Out 2 (see page 81, 86).

Care of Your Keyboard

1. Avoid heat, humidity and direct sunlight.
Do not overexpose your keyboard to direct sunlight, place it near a heater, or in any area are subject to high temperatures.

2. Severe impact can result in malfunction.
This digital synthesizer is composed of precision electronic components which can be damaged when subjected to severe impacts. Be sure to pack it carefully when transporting, using a case whenever possible.

3. Avoid direct contact with liquids, dirt, dust, etc.
Never allow foreign matter to enter between the keys of your VZ-1. Also, be especially careful of metallic objects such as hairpins, sewing needles or coins. Do not allow the unit to get wet.

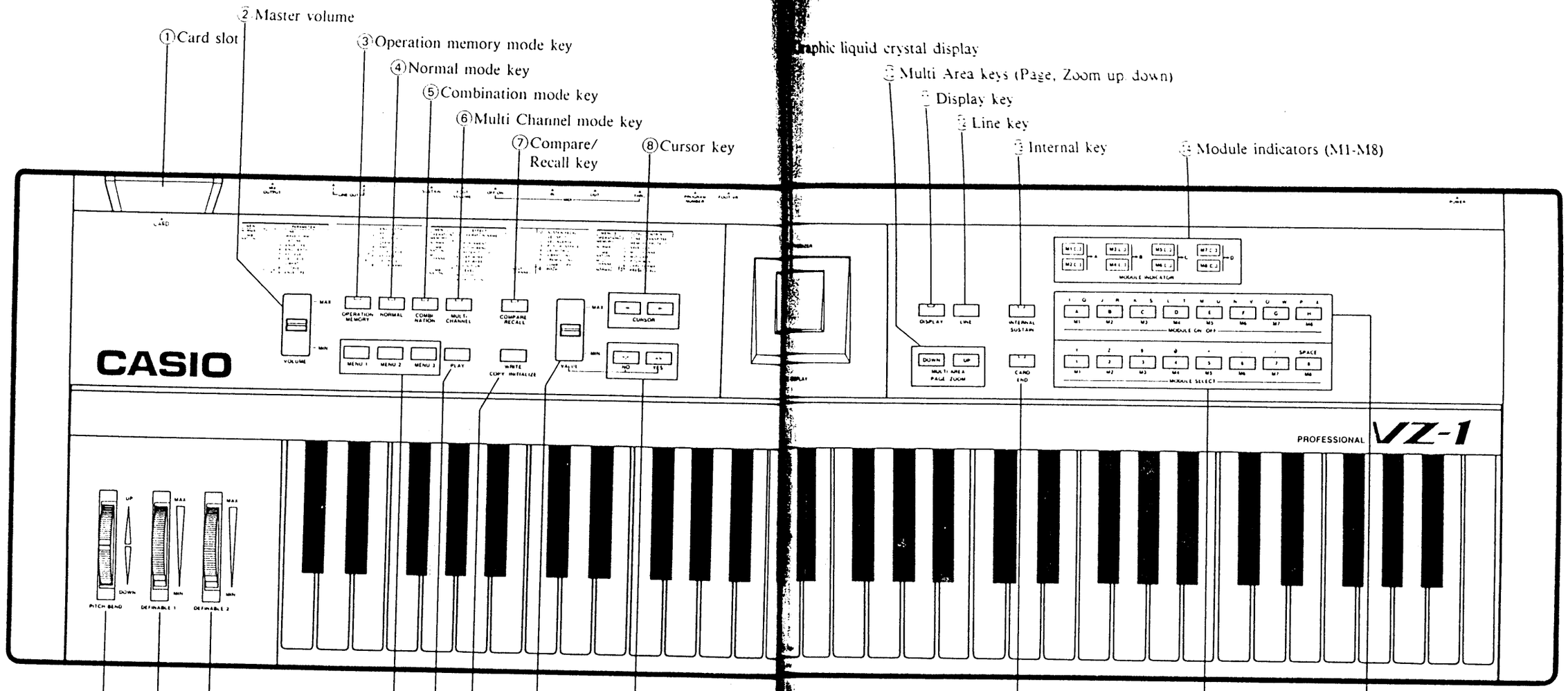
4. Never attempt to modify any part of the unit.
Any modification of, or tampering with the VZ-1's internal components can cause trouble or malfunction. If your unit is not operating properly, be sure to take it to an authorized Casio service center.

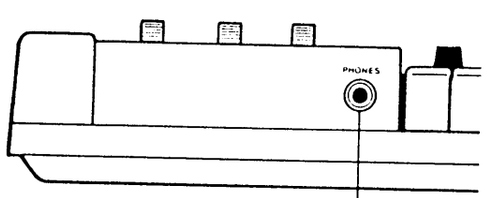
5. Do not use caustic cleaning agents.
Clean your keybaord with a soft cloth dampened with a mild detergent solution. Use of thinner, alcohol, benzene and similar chemicals should be avoided under all circumstances.

6. Avoid using this unit near televisions, radios, etc.
Because this unit uses digital circuitry, it may cause interference with other electronic devices such as televisions, radios, etc.

Care of Your ROM Card (RC-100)

1. Take care not to bend or drop your ROM card. Never carry it in your back pocket or leave it in other areas where it may be damaged.
2. When not in use, be sure to store your ROM card in its custom case to prevent damage due to dust etc.
3. Your ROM card containes precision electronic components. Never try to take it apart for any reason.
4. Casio claims no responsibility whatsoever for damages due to losses of ROM card data.





①Card slot
Insert ROM or RAM cards for save/load of sound data. With a ROM card, up to 128 individual patches and 128 operation memories can be stored. RAM cards allow storage of up to 64 patches and 64 operation memories.

②Master volume
Used to adjust the overall output volume of the VZ-1.

③Operation memory mode key
Used to select the OPERATION MEMORY operational mode.

④Normal mode key
Used to select the NORMAL operational mode.

⑤Combination mode key
Used to select the COMBINATION operational mode.

⑥Multi Channel mode key
Used to select the MULTI CHANNEL operational mode.

⑦Compare/Recall key
Used during editing to "recall" the original sound (sound before editing) and "compare" it with the edited version. When the indicator is OFF or flashing, the original sound is output. When the indicator is ON, the edited version is output.

⑧Cursor key
Used to move the "cursor" within the various VZ-1 menu functions.

⑨Graphic liquid crystal display
Wide 64×96 dot backlit liquid crystal graphic display is used to display all VZ-1 menu functions. Many functions can be programmed/edited "graphically," as this display provides graphic representations of sound waveforms, envelopes, etc.

⑩Multi Area keys (Page, Zoom up/down)
Used to access display pages not presently appearing on display in multi-page functions, and "zoom" in on graphic images in functions which feature graphic display capability for precision graphic editing. In the Multi Channel mode, used to specify the multi-channel AREA NO.

⑪Display key
Used to access VZ-1 graphic editing in some functions (such as DCO/DCA envelope, VIBRATO, etc.)

⑫Line key
Used to access LINE display.

⑬Internal key
Used to specify sounds in the VZ-1 internal memory (as opposed to "card" sounds - sounds stored on RAM or ROM cards).

⑭Module indicators (M1 - M8)
Indicate active sound source modules.

⑮Headphone jack
Connect headphones for "private" performance.

⑯Pitch bend wheel
Used to "bend" the overall pitch according to Bend Range values set for each patch.

⑰Definable wheel 1
Used to control a variety of VZ-1 effects.

⑱Definable wheel 2
Used to control a variety of VZ-1 effects - same as Definable wheel 1, however Definable wheel 2 is "spring loaded", and returns to the minimum value position (back) when released.

⑲Menu sub-mode keys (1-3)
Used to specify the MENU which contains the function(s) you want to access for editing, in all 4 VZ-1 operational modes.

⑳Play sub-mode key
Used to enter the PLAY (performance) sub-mode in all 4 VZ-1 operational modes.

㉑Write key
Used to write edited sounds to either internal, card or operational memories.

㉒Value slider
Used to raise or lower values of various VZ-1 parameters.

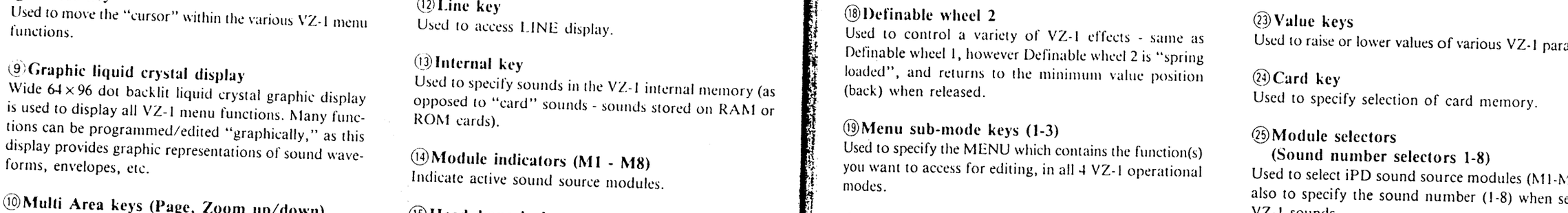
㉓Value keys
Used to raise or lower values of various VZ-1 parameters.

㉔Card key
Used to specify selection of card memory.

㉕Module selectors
(Sound number selectors 1-8)
Used to select iPD sound source modules (M1-M8) and also to specify the sound number (1-8) when selecting VZ-1 sounds.

㉖Module ON/OFF selectors (M1-M8)
(Sound bank selectors A-H)
Used to turn iPD sound source modules ON and OFF, and also to specify the sound bank (A-H) when selecting VZ-1 sounds.

REAR PANEL CONNECTIONS



①Power switch
Switches unit ON and OFF.

②Power terminal
For connection of accessory AC power cord

③Foot VR jack
For connection of "foot variable resistor" (foot pedal, VP-10, optional). Controls effects as set in MENU 2-06.

④Program number jack
Connect a foot switch (SP-10/SP-2, optional) for "hands-free" control of program number.

⑤MIDI terminals (IN/OUT/THRU)
For connection of other MIDI-equipped instruments and devices.

⑥MIDI ON/OFF switch
Switch control of MIDI ON/OFF.

⑦Foot volume jack
Connect a foot pedal for "hands-free" control of VZ-1 master volume.

⑧Sustain jack
Connect a sustain pedal (SP-10/SP-2, optional) for "hands-free" control of VZ-1 sustain.

⑨Line out jacks (1-2)
In the Combination mode or Multi-Channel mode, up to 4 patches or up to 8 areas are separated and assigned automatically into Line Out 1 or Line Out 2 (see page 81, 86).

⑩Mix output jack
Mixed output of all sounds assigned to LINE OUT channels 1 and 2.

Specifications

Model:	VZ-1
Number of keys:	61 KEYS (5 OCTAVES) with TOUCH RESPONSE — INITIAL/AFTER TOUCH
Polyphonic:	16 NOTE POLYPHONIC
Sound source:	iPD (interactive phase distortion) SYSTEM
Modes:	NORMAL/COMBINATION/OPERATION MEMORY/MULTI CANNEL
Programmer:	PRESET VOICES;64/INTERNAL VOICES;64/ROM CARD VOICES;128/RAM CARD VOICES;64 PRESET OPERATIONS;64 (when system initialized) INTERNAL OPERATIONS;64/ROM CARD OPERATIONS;128/RAM CARD OPERATIONS;64 COMPARE/RECALL;5
Modules:	8 × (DCO + DCA), ON/OFF
Parameters:	INT LINE (MIX/RING/PHASE), EXT PHASE (ON/OFF), WAVE FROM:8, DETUNE (PITCH FIX, HARMONIC, POLARITY, OCT, NOTE, FINE) <DCO> ENVELOPE (STEP = 1 ~ 8, RATE = 0 ~ 99, LEVEL = − 63 ~ + 63, SUS, END), ENV DEPTH (RANGE = WIDE/NARROW, DEPTH = 0 ~ 63), KF LEVEL (POINT = 1 ~ 6, KEY = C0 ~ C9, LEVEL = 0 ~ 63), VEL LEVEL (SENSITIVITY = 0 ~ 31, CURVE = 1 ~ 8), VIBRATO (WAVE:4, DEPTH = 0 ~ 99, RATE = 0 ~ 99 , DELAY = 0 ~ 99, MULTI ON/OFF), OCTAVE (− 2 ~ + 2) <DCA> ENVELOPE (STEP = 1 ~ 8, RATE = 0 ~ 99, LEVEL = 0 ~ 99, SUS, END), ENV DEPTH (DEPTH = 0 ~ 99), KF LEVEL (POINT = 1 ~ 6, KEY = C0 ~ C9, LEVEL = 0 ~ 99), VEL LEVEL (SENSITIVITY = 0 ~ 31, CURVE = 1 ~ 8), TREMOLO (WAVE:4, DEPTH = 0 ~ 99, RATE = 0 ~ 99, DELAY = 0 ~ 99, MULTI ON/OFF), AMP SENSITIVITY (0 ~ 7), TOTAL LEVEL (0 ~ 99) <DCO/DCA> KF RATE (POINT = 1 ~ 6, KEY = C0 ~ C9, RATE = 0 ~ 99), VEL RATE (SENSITIVITY = 0 ~ 31, CURVE = 1 ~ 8, PITCH ENV STEP = ENA/DIS, AMP ENV STEP = ENA/DIS), VOICE NAME (12 characters), PARAMETER, COPY, INITIALIZE
Effect:	PORTAMENTO (TIME = 0 ~ 99, MODE = 0/1), SOLO (ON/OFF), PITCH BEND (RANGE = 0 ~ 48, RELEASE = ENA/DIS), AFTER TOUCH/DEFINABLE WHEEL 1,2/FOOT VR (SENSITIVITY = 0 ~ 99, − 1 ~ − 99, VIB DEPTH = ON/OFF, VIB RATE = ON/OFF, PITCH = + ON/ − ON/OFF, PORTAMENTO TIME = ON/OFF, TREMOLO DEPTH = ON/OFF, TREMOLO RATE = ON/OFF, AMP ENV BIAS = ON/OFF), COMBINATION LEVEL (0 ~ 99), COMBINATION PITCH (POLARITY, OCT, NOTE, FINE) SPLIT POINT (POINT = C0 ~ C9, UPPER SP = D0 ~ C9, MIDDLE SP = C♯0 ~ B8, LOWER SP = C0 ~ B♭8), SUSTAIN PEDAL = ENA/DIS, VEL SPLIT(RANGE = 1 ~ 127), VEL INVERSE = ON/OFF, POS CROSSFADE (EFFECT = ON/OFF, POSITION = C0 ~ C9, DELAY TRIGGER (DELAY = 0 ~ 99), VIB INVERSE = ON/OFF, TREMOLO INVERSE = ON/OFF, COMBINATION COPY, INITIALIZE, OPERATION NAME (12 characters), AREA PITCH (POLARITY, OCT, NOTE, FINE)
Inputs/Outputs:	line out (1.2 mix) Output impedence: 0.1 kΩ Output voltage: 0.6V RMS max. headphones, foot volume, sustain, foot VR, program number, MIDI IN/OUT/THRU

Total control:	TUNE (A4 = 417.2 ~ 442 ~ 468.3Hz) TRANSPOSE (G ~ C ~ F♯) MEMORY PROTECT (INT = ON/OFF, CARD = ON/OFF) SAVE/LOAD (CARD/MIDI), MIDI CHANNEL (RECEIVE = 1 ~ 16, SEND = 1 ~ 16), MIDI DATA (PROG NO. = 0 ~ 127, EXCLUSIVE = ENA/DIS CONTROL NO. = 12 ~ 31, VOLUME IN = ENA/DIS) CARD FORMAT, PRESET CALL
Display:	64 × 96 dot matrix (with back light)
Power supply:	100V, 120V, 220V, 240V AC
Memory back up:	Built-in lithium battery (life: aprrox. 5 years)
Power consumption:	16 W
Dimensions:	1060(W) × 324(D) × 93(H) mm (41¾"(W) × 12¾"(D) × 3 11/16"(H))
Weight:	12 kg (26.5 lbs.)
Standard accessories:	AC power cord, ROM card, plug cord set, dust cover

**Design and specifications are subject to change without notice.*

GUIDELINES LAID DOWN BY FCC RULES FOR USE OF THE UNIT IN THE U.S.A. (not applicable to other areas).

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

..... reorient the receiving antenna
..... relocate the computer with respect to the receiver
..... move the computer away from the receiver
..... plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the US Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4.

WARNING:

CHANGING THE VOLTAGE SELECTOR MAY REQUIRE THE USE OF A DIFFERENT LINE CORD OR ATTACHMENT PLUG, OR BOTH. TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

IMPORTANT SAFETY INSTRUCTIONS

"INSTRUCTIONS PERTAINING TO A RISK OF FIRE, ELECTRIC SHOCK, OR INJURY TO PERSONS"

WARNING — When using electric products, basic precautions should always be followed, including the following:

1. Read all the instructions before using the product.

2. To reduce the risk of injury, close supervision is necessary when a product is used near children.

3. Do not use this product near water - for example, near a bathtub, washbowl, kitchen sink, in a wet basement, or near a swimming pool, or the like.

4. This product should be used only with a stand that is recommended by the manufacturer.

5. This product, either alone or in combination with an amplifier and headphones or speakers, may be capable of producing sound levels that could cause permanent hearing loss. Do not operate for a long period of time at a high volume level or at a level that is uncomfortable. If you experience any hearing loss or ringing in the ears, you should consult an audiologist.

6. The product should be located so that its location or position does not interfere with its proper ventilation.

7. The product should be located away from heat sources such as radiators, heat registers, or other products that produce heat.

8. The product should be connected to a power supply only of the type described in the operating instructions or as marked on the product.

9. This product may be equipped with a polarized line plug. This is a safety feature. If you are unable to insert the plug into the outlet, contact an electrician to replace your obsolete outlet. Do not defeat the safety purpose of the plug.

10. The power-supply cord of the product should be unplugged from the outlet when left unused for a long period of time.

11. Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.

12. The product should be serviced by qualified service personnel when:

A. The power-supply cord or the plug has been damaged; or

B. Objects have fallen, or liquid has been spilled into the product; or

C. The product has been exposed to rain; or

D. The product does not appear to operate normally or exhibits a marked change in performance; or

E. The product has been dropped, or the enclosure damaged.

14. Do not attempt to service the product beyond that described in the user-maintenance instructions. All other servicing should be referred to qualified service personnel.

SAVE THESE INSTRUCTIONS

GROUNDING INSTRUCTIONS

This product must be grounded. If it should malfunction or breakdown, grounding provides a path of least resistance for electric current to reduce the risk of electric shock. This product is equipped with a cord having an equipment-grounding conductor and a grounding plug. The plug must be plugged into an appropriate outlet that is properly installed and grounded in accordance with all local codes and ordinances.

DANGER — Improper connection of the equipment-grounding conductor can result in a risk of electric shock. Check with a qualified electrician or serviceman if you are in doubt as to whether the product is properly grounded. Do not modify the plug provided with the product — if it will not fit the outlet, have a proper outlet installed by a qualified electrician.